

DJ800

Monitor Service Guide



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Chapter One : Introduction to the RMA System

1. How to apply for an RMA

All normal repairs are resolved through the Strategic Business Development Group of MAG in Taiwan or MAG's local service centers. In order to track returned products, the Strategic Business Development Group and local service centers must issue an RMA (Return Material Authorization) number to the customer whether the product is within the warranty.

2. Required Information When Applying for an RMA

In order to obtain warranty service, the product must be delivered with:

- A. Model number
- B. Serial number
- C. Manufacture date
- D. Error code

3. Warranty

i Limited Warranty

MAG warrants MAG products against defects in material and workmanship for a period of time for parts and labor according to the contract agreed by MAG and the customer. MAG will repair or replace at its option, the product and any of its parts which fail to conform to this warranty during the term of the warranty. MAG may replace or repair the product using new or refurbished parts. All replaced parts belong to the property of MAG.

All warranty repairs must be performed by MAG authorized repair centers.

ii Exclusions

This limited warranty does not cover the repair of cracked, scratched, broken or modified plastics or other cosmetic damage which includes altered, defaced, or removed parts and scratched CRT. An invalid warranty is described as below:

• Misuse

The limited warranty does not apply to improper maintenance, misuse, neglect, incorrect line voltage, phosphor burns, impurity problems, and operation contrary to furnished instructions. (Aging CRT may reduce focus and result in bad luminance characteristic of the monitor; CRT phosphor burns are caused by operating at excessive brightness levels for extended periods; and impurity problems may result from monitor mishandling.)

• Faulty repair by customer

The limited warranty does not apply to repairs or replacement necessitated by any cause beyond the control of MAG including, but not limited to, any malfunction, defects or failure which in the opinion of MAG are caused by or resulting from unauthorized service or parts.

- **Poor Packaging**

In order to obtain warranty service, the product must be delivered in its original package or an equivalent (to avoid shipping damage). The limited warranty does not apply to damage caused by poor packaging and shipping.

4. **Repair Routine**

i **Before Repair**

- * When you unpack an RMA monitor, check for poor packaging. Sometimes poor packing causes poor purity of CRT, a broken bezel or broken housing.
- * Remove the housing and check the set for damage by the customer's misuse or faulty repair.
- * If the RMA monitors are treated with wrong way described above, please stop repairing and inform your supervisor to deal with customers.

ii **Repairing**

- * Fix the set according to the Error Code and error description from user.
- * If you cannot immediately find the problem, run the set's burning-in test and check again.
- * Replace the defective components with MAG standard spare parts. Except for those recorded in the Engineering Change Notice (ECN), do not try to change the value of the resistors, capacitors, or other components to a number different from the original setting.
- * In the process of repairing, please put the important Engineering Change Notice (ECN) on all RMA sets. The important ECN has solutions to specific potential defects. Make sure ECN components are added to the RMA set to avoid returns with the same problem.

iii **Alignment**

Input MAG primary timing and pattern to align H-size, H-phase, V-size, V-position, V-linearity, white balance, focus and convergence. Then check every preset timing to confirm they are within the customer specifications.

iv **Burn-in Test**

- * All finished RMA sets should go through a 24-hour burn-in test. The inspector will check the monitor's performance according to the specifications afterwards.
- * If the set failed to pass the inspection, return it to the technician again.

v **Refurbishing**

- * Clean the outside of the monitor with a non-alcoholic cleaner. (Alcoholic cleaners make silk-screen colors fade). Renew the polystyrene and carton.

MAG service policy for handling the impurity problem

CRT is the most significant and expensive part of the monitor. Most disputes are CRT related, especially on impurity. Many CRT problems were resulted from mis-handling or freight damage during transportation. MAG is very concerned of the issue, and sincerely hope that we can help to solve the problem and to avoid the incidence from happening again.

Here are our suggestions:

- * Buy local insurance as MAG is doing on trucking transportation to cover those damages.
- * Use the original packing material to return the RMA goods.

MAG's packing material is able to pass the drop test height of 76cm in normal transportation and handling.

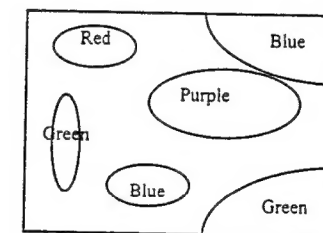
RMA goods received with any of the following situations is assumed to be customer's liability.

Rule 1: Judge from the appearance

1. Broken bezel/housing
2. Broken carton/polystyrene
3. Scratched CRT
4. Broken CRT
5. Not using MAG original or equivalent packing.
6. CRT phosphor burnt at fixed pattern for extended period.
7. Unauthorized modifications or partially repaired by customers

Rule 2: Use a demagnetiser to determine whether the color mask is damaged

1. Impurity which can be degaussed by a demagnetiser is treated as within warranty
2. Impurity which CANNOT be degaussed is treated as out of warranty
3. Using figure 1 to check impurity. If there are irregular impurity color blocks on the screen, it will be treated as out of warranty.



LOCAL #RMA REPAIR REPORT

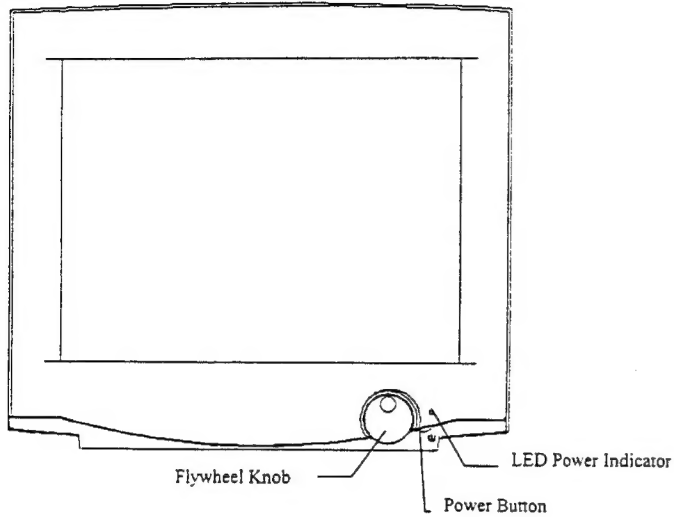
No	Customer	RMA No.	Model	Series Number	Manu Date	Receive Date	Error Code	Sub Code	Sub Description	Remarks
01										
02										
03										
04										
05										
06										
07										
08										
09										
10										
11										
12										

Checked By : _____

Repaired By : _____

Fixed Date : _____

Chapter Two : Controls



1. Basic Controls

i Power Button

Power On and Off the DJ800. The LED power indicator (next to the power button) will light when the power is switched ON.

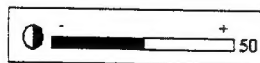
ii LED Power Indicator

This LED power indicator will be green when the system is completely powered up.

iii Flywheel Knob

Adjust the Contrast

When *only* turning the Flywheel knob (OSD Main Menu will not appear) the following scale bar (see picture) appears. Turn the Flywheel knob to increase or decrease the Contrast. If the knob is not pressed for 9 seconds, the displayed Contrast scale bar will automatically disappear.



2. OSD Menus

There are six OSD (On Screen Display) menus available, the Main Menu, the Color Manager, the Language Manager, the User Manager, The Special Function Manager and OSD Manager. Press the Flywheel knob to enter the Main Menu. If the Knob is not pressed within 17 seconds, the displayed OSD menu will disappear automatically..

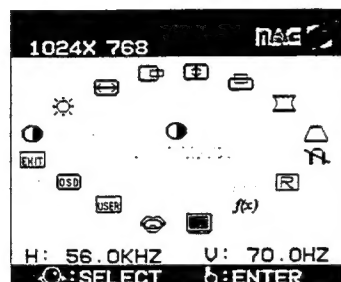
3. How to Adjust Other Visual Settings on the Main Menu

- Step 1: Press the Flywheel knob to enter the Main Menu.
 Step 2: Rotate the Flywheel knob and select an item by highlighting desired item in Yellow color. Press the knob to confirm the selection.
 Step 3: Rotate the Flywheel knob to the proper adjustment.
 Step 4: Repeat Step 2 & Step 3 to make other adjustments if necessary.

* The OSD menu will disappear if the knob is not moved for a period of 10 seconds.

4. Description of Each Menu & Control

i The Main Menu

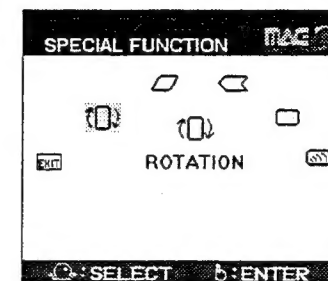


There are 16 controls in the OSD Main Menu. They are described as follows:

- Contrast (☉): Increases and decreases the contrast of the display.
- Brightness (☀): Increases and decreases the brightness of the display.
- H-size (☐): Increases and decreases the horizontal size (width) of the display.
- H-phase (☐): Shifts the display horizontally.
- V-size (☐): Increases and decreases the vertical size (height) of the display.
- V-position (☐): Shifts the display vertically.
- Pincushion (☐): Alters the vertical edges of the display to bend the image inward or outward.
- Trapezoid (☐): Adjusts the trapezoid distortion.
- Degauss (⚡): Manual degauss of the CRT.
- Recall (⏮): Recalls all geometry controls to the optimal pre-programmed (factory) setting.
- Special Function (fx): Press the Flywheel knob to enter the sub-menu "Special Function".

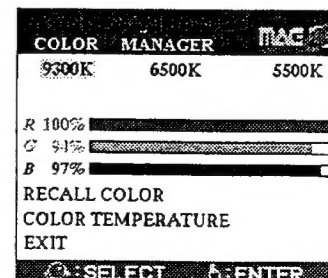
- Color Manager (CM): Press the Flywheel knob to enter the sub-menu "Color Manager".
- Language Manager (LM): Press the Flywheel knob to select the language.
- User Mode (USER): Press the Flywheel knob to enter the sub-menu "User Mode".
- OSD Manager (OSD): Press the Flywheel knob to adjust the location of the OSD Menu.
- Exit (EXIT): Press the Flywheel knob to exit the OSD control.

ii Advanced Functions



- Exit (EXIT): press the Flywheel knob to return to the Main Menu.
- Rotation (⤴): adjusts the tilt of the display.
- Parallelogram (▭): bends both sides of the display to the left or to the right.
- Balance (☐): adjusts the horizontal balance of the display.
- Corner (☐): adjusts 4 corners of the display.
- Moire (☐): minimizes moire interference pattern.

iii Color Manager Menu



There are three preset color temperature modes (9300°K, 6500°K. and 5500°K). and three user color modes.

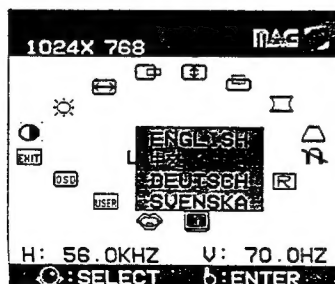
iv **How to select a color mode?**

- Step 1: Press the Flywheel knob and select the Color Manager icon, and press the knob again to enter the Color Manager Menu.
- Step 2: Rotate the knob to choose the color mode you want. Press the knob to move the cursor to "R" and start any adjustment if necessary.

* After selecting one of the color modes, you can start to adjust the color characteristics of the display. If it is one of the preset color mode (9300°K, 6500°K. and 5500°K), when you change any color characteristics, the parameters of the color characteristics will be stored as a user color mode automatically. Meanwhile, the letter stands for the selected preset color mode will turn to the letter stands for the corresponding user color mode.

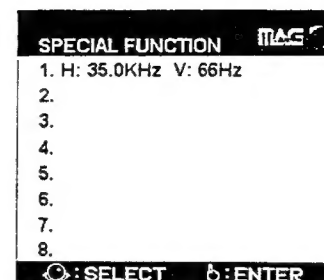
- Red Video Gain Control (R):**
Rotate the Flywheel knob to increase or decrease the red video gain level.
- Green Video Gain Control (G):**
Rotate the Flywheel knob to increase or decrease the green video gain level.
- Blue Video Gain Control (B):**
Rotate the Flywheel knob to increase or decrease the blue video gain level.
- Recall Color**
This control is used to recall the selected user color mode to its preset color temperature mode. Press the knob to recall the preset color mode.
- Color temperature**
This control is used to return the cursor to the position of the selected color mode and let users to select another color mode.
- Exit**
Press the knob to return to the Main Menu.

v **Language Manager**



There are four languages in this sub-menu – English, Chinese, German and Swedish.

vi **User Mode**



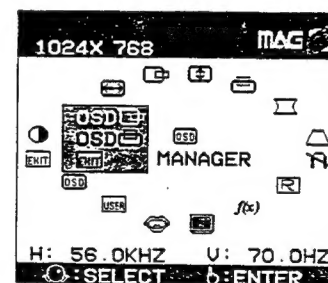
DJ800 offers 8 user modes for the user to save the display characteristics of video mode which is not one of the preset modes stored in the permanent memory.

To store a User Mode:

- Step 1: If the current video mode is a new mode, enter the sub-menu "User Menu".
- Step 2: Rotate the Flywheel knob to select the number of the user mode.
- Step 3: Press the knob to save. Both the horizontal and vertical frequencies are shown then.

vii **OSD Manager Menu**

There are only three items in this sub-menu which control the OSD characteristics.



Description of each control

- OSD (): shifts the OSD menu left or right.
- OSD (): shifts the OSD menu up or down.
- Exit (): Press the Flywheel knob, and return to the Main Menu.

Chapter Three : Engineering Specifications

1. ELECTRICAL PERFORMANCE

This document defines the performance and customer inspect requirements for MAG 19 inch, FST (flat square tube) high-resolution monitor. The monitor is designed for, and displays a multiple set of input timings for horizontal rate between the limits from 30kHz to 86kHz

All items must be performed under "standard test conditions" unless otherwise specified.

1.1 STANDARD TEST CONDITIONS

- Warm up time: 30 minutes
- Face east
- User or automatic degaussing
- AC supply voltage: 90~264 Vac, 48~62Hz
- Ambient temperature: 25°C +/- 5°C
- Humidity: 5 - 90 %
- Display mode: 1280x1024 @75 Hz (Standard mode)
- Background raster is set to 0.7 ± 0.5 FL.
- Light output for full white: 30 FL Min. (ABL).
- Center window: windows size ≤ 1/8 screen size
- Input signal: 0.7 ± 0.1 Vpp
- External controls for picture geometric and position: Preset position
- Video generator: Chroma 2250 or equivalent

1.2 CRT DESCRIPTION

- Manufacturer: Hitachi High contrast CRT.
- 0.26mm dot pitch, anti-glare, anti-static, anti-reflection
- Size: 19 inch

1.3 POWER SUPPLY

1.3.1 AC INPUT RANGE

- Voltage: 90 ~ 264 Vac.
- Frequency: 48 ~ 62 Hz

1.3.2 POWER CONSUMPTION

Maximum 140 Watt the specified voltage and frequency ranges

1.3.3 POWER LINE TRANSIENT IMMUNITY

The power supply shall function properly after being subjected to a 1 microsecond, 3000 volt peak pulse, with a rise time of approximately 1.2 microseconds, applied either differentially or single ended to line and neutral at any phase of the power line voltage. Additionally, this shall not cause an unsafe operating condition.

1.3.4 INPUT AC LEAKAGE CURRENT

The maximum AC leakage current returning through the AC earth ground of the input AC connector shall be 3.5 mA. This current is measured at the high limit of the input AC voltage.

1.3.5 POWER LINE SURGE

The monitor shall meet IEC801-4: 1988 (Fast Transient Burst Immunity) Level 2.

1.3.6 INRUSH CURRENT

- 1) For 120 Vac input 35A max. at cold start and 50A max. at warm start.
 - 2) For 240 Vac input 60A max. at cold start and 80A max. at warm start.
- The inrush current is measured at 25°C with the test unit temperature stabilized.

1.3.7 POWER ON DEGAUSS

When powered on, the monitor performs an automatic degauss to insure chromaticity. For best degauss results, the monitor should be powered down for 60 minutes before being powered up again. Additionally, a control may be added to manually degauss.

1.4 ELECTROSTATIC DISCHARGE

9KV (150PF + 330 Ω) without failure

1.5 HIGH VOLTAGE

26KV typical (at cut-off condition)

1.6 X-RAY PROTECTION

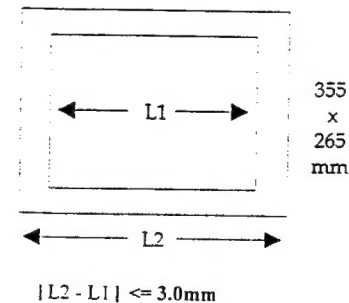
Operation of the CRT is only allowed within the CRT specifications. The X-ray protection circuit monitors the flyback voltage and shuts down the horizontal stage if the anode voltage is ever higher than 32.5kV.

1.7 PICTURE SIZE

Standard and Primary Modes	Other Modes
355 ± 5mm	355 ± 10mm
265 ± 5mm	265 ± 10mm

Full size scan shall be capable for all factory-preset timings.

1.8 RASTER REGULATION (for all modes)



1.9 PROTECTION CIRCUIT

- Spot suppression circuit protects the screen at power-off
- Missing or improper sync pulses will not damage the monitor

1.10 PULL-IN RANGE OF SYNCHRONIZATION

- Horizontal range: 30KHz - 86KHz
- Vertical range: 50Hz - 160Hz

1.11 VIDEO BANDWIDTH

- 135 MHz (-3dB) nominal

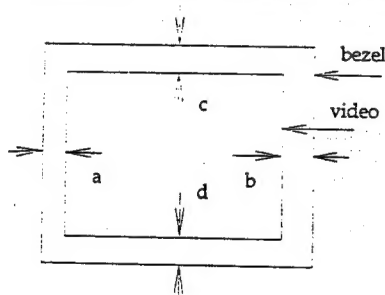
1.12 INTERFACE

- Video R.G.B. Input Level: Analog 0.7 ± 0.1 Vpp
Polarity: positive
Impedance: $75\Omega \pm 2\%$
- Sync Signal Definition Separate horizontal and vertical synchronization signals which are generated by a TTL, or TTL equivalent source.
- Input Sync Voltages All signal levels between 0 and 0.8 V are defined as logic "0".
All signal levels greater than 2.0 Vac are defined as logic "1".
- DDC Capability Compatible with DDC2.0 (Display Data Channel) and above standard.

2. PICTURE PERFORMANCE

Implies "Standard test conditions" unless otherwise specified.
Values were measured after a 30-minute warm-up period.

2.1 NOMINAL PICTURE SIZE INCLUDING CENTERING



Standard/Primary Modes:

- H-size: 355 +/- 5 mm
- V-size: 265 +/- 5 mm

- H-offset: $|a-b| \leq 3$ mm
- V-offset: $|c-d| \leq 3$ mm

Other Modes:

- H-size: 355 +/- 10 mm
- V-size: 265 +/- 10 mm

- H-offset: $|a-b| \leq 4$ mm; Video within raster
- V-offset: $|c-d| \leq 4$ mm; Video within raster

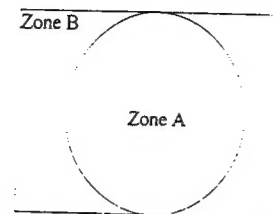
2.2 SIZE CONTROL RANGE

- All modes
Horizontal (Nominal -5) mm to Full Scan
Vertical (Nominal -5) mm to Full Scan

2.3 POSITION CONTROL RANGE (related to center position)

- | | Standard and Primary modes | Other modes |
|--------------|----------------------------|--------------|
| - Horizontal | ≥ 20 mm | ≥ 20 mm |
| - Vertical | ≥ 15 mm | ≥ 15 mm |

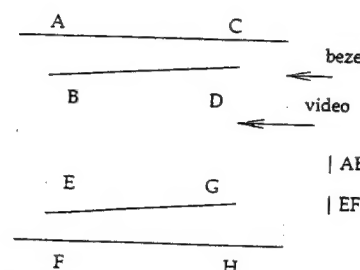
2.4 MISCONVERGENCY



- Zone A: 0.3 mm in all modes
- Zone B: 0.4 mm in all modes

Zone A is defined as a circle at the Center of the CRT with a diameter of the vertical picture size.
Zone B is the total display area Excluding zone A.

2.5 TILT



$$|AB - CD| = \text{Tilt on top} \leq 1.5\text{mm}$$

$$|EF - GH| = \text{Tilt on bottom} \leq 2.0\text{mm}$$

2.6 LINEARITY

- Horizontal $\leq 10\%$
- Vertical $\leq 10\%$

$$(\text{Max} - \text{Min}) / \text{average} \times 100\% \leq 10\%$$

Check linearity with 12 x 8 crosshatch pattern.

Definition of Average: Average-vertical = Picture vertical size / 8 ;

Average-horizontal = Picture horizontal size / 12.

2.7 GEOMETRIC DISTORTIONS (INCLUDES ALL DISTORTION LIKE PINCUSHION, BARREL, TRAPEZOID...)

	Standard and Primary modes	Other modes
- Total geometric distortion		
Top & Bottom	≤ 3.0 mm	≤ 3.0 mm
Left & Right	≤ 2.5 mm	≤ 2.5 mm
- Barrel		
Top & Bottom	≤ 3.0 mm	≤ 3.0 mm
Left & Right	≤ 1.0 mm	≤ 1.5 mm
- Pincushion		
Top & Bottom	≤ 3.0 mm	≤ 3.0 mm
Left & Right	≤ 1.5 mm	≤ 2.0 mm
- Corner		
Top, Bottom, Left & Right	≤ 1.0 mm	≤ 1.5 mm
- S Curve	≤ 1.5 mm	≤ 1.5 mm

According to DIN 66234 T2 the geometric distortion of the picture must be less than 1% of the nominal picture size.

2.8 JITTER

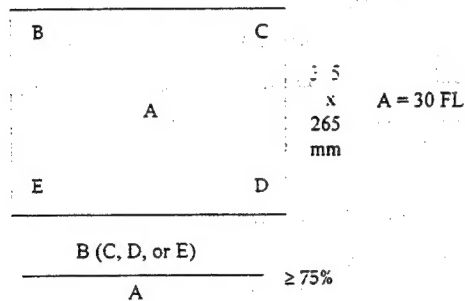
Jitter of character < 0.1 mm (DIN 66234 T2) inspected at 40 cm away from DUT.

3. LUMINANCE OUTPUT

Under standard test conditions

- Resolution: 1280 x 1024
- Vertical frequency: 75 Hz
- Horizontal frequency: 80 kHz
- Measured at CRT center position
- 100 % full white pattern: 30 FL min. (Full white at Brightness → Max. Contrast → Max.)
- Center window pattern (Chroma default pattern: 112): 38FL min. (Brightness → Max; Contrast → Max.)
- Background: 0.7 ± 0.5 FL (Brightness → max.; Contrast → min.)

3.1 BRIGHTNESS UNIFORMITY



If uniformity problems occur, limit sample has to be defined.

3.2 WHITE COLOUR COORDINATES

Full light output

9300 degree K	6500 degree K	5500 degree K
x = 0.281 +/- 8 %	x = 0.313 +/- 8 %	x = 0.332 +/- 8 %
y = 0.311 +/- 8 %	y = 0.329 +/- 8 %	y = 0.348 +/- 8 %

Background

9300 degree K
x = 0.281 +/- 8 %
y = 0.311 +/- 8 %

- Test at
- background: Brightness → max.; Contrast → min.
 - with light output: Brightness → min. ; Contrast → 5FL to Max.
 - center window pattern

3.3 FOCUS

Light output setup: Pattern: Center window
Light output: 38FL.

Test pattern: H

Limit samples have to be selected by both parties if problems rise up during mass production. The focus has to be equal or better than the "limited sample."

3.4 PURITY

No electron beam will land on other phosphors. If problems rise up during mass production, "limit samples" have to be selected by both parties. The purity has to be equal or better than the "limit sample".

3.5 MOIRE

On Screen Display control adjustable

3.6 RING

- Ringing is invisible. (Independent of the running mode ; light output : 15FL and above).
- If problems rise up during mass production, " limit samples " have to be selected by both parties. Ringing and moiré has to be equal or better than the " limit sample ".

3.7 DISTANCE BETWEEN TWO MONITORS

Two monitors of the same type with different frequencies can be operated at a distance of down to 25 cm without any interference.

4. REGULATORY APPROVALS

4.1 Safety

- UL 1950
- CSA C22.2 NO. 950-M89
- CE Mark EN 60950
- CB Scheme IEC 950
- AS/NZS 3260: 1993
- TUV / GS
- NEMKO

4.2 X-RAY

- DHHS

4.3 EMC

- FCC Class B
- CE (For CE , product periodically retest is requested)
EN50081-1
EN55022:1995 Class B
EN61000-3-2: 1995
EN61000-3-3: 1995
EN50082-1: 1992
EN6100-4-2: 1992
ENV50140: 1994
EN61000-4-4: 1995
- VCCI Class 2 ITE
- AS/NZS 3548: 1992
- FDA CFR21 .

4.4 LOW RADIATION

- Certificate from SEMKO measured according to MPR II guidelines 1990-10.
- TCO 92 , TCO 95 (optional)

4.5 ERGONOMICAL DEMANDS AND GENERAL REQUIREMENTS

- ISO 9241 part 3 respectively EN 29241-3 as far applicable
- ISO 9241 part 8

5. RELIABILITY

5.1 MONITOR Mean Time Between Failure (MTBF)

The MTBF of the monitor has to be 50,000 hours demonstration MTBF. The demonstrated MTBF shall be 60,000 hours.

5.2 LIFETIME OF CRT

Refer to CRT Specification

5.3 ARCING OF CRT

Arcing test is performed with a laser gun, 50 times on each grid and cathode

5.4 AMBIENCE

Operating temperature: 5 - 40°C (41 - 104°F)
Storage temperature: -25 - 60°C (-13 - 140°F)
Humidity: 5 - 90%

5.5 VIBRATION TEST & DROP TEST

Follow MAG Reliability Test Procedure FWU-001 Section II Environment Test

6. MECHANICAL SPECIFICATION

6.1 MAIN DIMENSIONS

Without packing:
- Width: 460mm x Height: 450mm x Depth: 465mm

6.2 WEIGHT

- Net: 21Kg; Gross: 25Kg

6.3 TILT / SWIVEL ANGLE

- 90 +/- 5 degree side to side
- 13 +/- 1 degree up
- 5 +/- 1 degree down

6.4 PLASTIC

6.4.1 MATERIAL

Material for front bezel, housing, power knob, control knob are ABS (PA-765A) and for tilt / swivel base is ABS 94HB (PA-707).

6.4.2 COLOR

Resin color is IBM color

6.5 RECYCLE

- Metal-coated plastic is not allowed.
- Plastic part larger than 20 cm x cm or heavier than 50g have to be marked with material designation and recycling symbol (DIN 54840)
- All parts should be easily recyclable (VD 12243)
- All packing materials made from plastic have to be marked with recycling sign in accordance with subpart (DIN 6120).

7. CONTROLS AND CONNECTORS

7.1 INPUT CONNECTORS:

Pin number	Pin function
1	Red video input
2	Green video input
3	Blue video input
4	No connection
5	Ground
6	Red return
7	Green return
8	Blue return
9	No connection
10	Ground
11	Ground
12	SDA
13	Horizontal-sync (composite sync)
14	Vertical-sync
15	SCL

7.2 EXTERNAL CONTROLS & INDICATORS (WITH FREE RUN SELFTEST PATTERN)

1. Main power switch in front of panel
2. On-Screen-Display (OSD) manual on Flywheel
3. Power LED
4. OSD manual
 - a. Geometric manager
Contrast, Brightness, H-size, H-phase, V-size, V-position, Pincushion, Trapezoid, Degaussing, Recall, Special function, Color Manager, Language selection, User mode, OSD Manager, Exit
 - b. Special function
Rotation, Parallelogram, Bow, Corner, Moiré erase, Exit
 - c. Color Manager
Color temperature preset modes: 9300°K, 6500°K, 5500°K
Color control user modes: user 1, user 2, user 3, Recall, Exit

On Screen Display:

Page 1:

1. Contrast Control
2. Brightness Control
3. Horizontal Size Control
4. Horizontal Position Control
5. Vertical Height Control
6. Vertical Position Control
7. Pincushion Control
8. Trapezoid Control
9. Degaussing
10. Recall

Page 2: Special Functions

1. Rotation
2. Parallelogram
3. Bow
4. Corner
5. Moiré
6. Exit

Page 3: Color Manager 9300°K, 6500°K, 5500°K

1. Color Red Control
2. Color Green Control
3. Color Blue Control

Page 4: Language

1. English,
2. Germany,
3. French,
4. Chinese

Page 5: OSD Manager

1. Horizontal Position
2. Vertical Position

Page 6: Save User Mode

1. User can save eight non-factory preset timings.

8. PLUG & PLAY

MAG DJ800 model is the PnP and Windows95, WindowsNT compatible monitor. The Display Data Channel "DDC" function can allow the display to inform the host system about its identity and, depending on the level of DDC used, communicate additional levels of display capabilities.

DDC1: One uni-directional data channel

DDC2: One bi-directional data channel

MAG DJ800 incorporates the digital interface to support display type DDC1 and DDC2B as defined by the VESA Display Data Channel standard Ver. 1.0 and above. The host computer can retrieve information consisting of 128 bytes of specific data (EDID) from the monitor.

9. DISPLAY POWER MANAGEMENT

9.1 DEFINITION OF MODES

There are three modes of operation for MAG DJ800. These are ON, SUSPEND and OFF.

ON	Both Horizontal and Vertical sync are present and the monitor is in normal operation.
SUSPEND	Horizontal or Vertical sync is inactive per VESA DPMS spec. and not operational. All parts of the monitor are disabled except for the CRT heater and the Detection Logic Circuit. With CRT heater "hot", the monitor is able to perform a quick start when both Horizontal and Vertical signals are active again.
OFF	Both Horizontal and Vertical sync are inactive per VESA DPMS spec. and not operational and all parts of the monitor are disabled including the CRT heater. This is the lowest possible power state of the monitor that maintains automatic on when the both Horizontal and Vertical signals are active again. Restart will take longer than the suspend mode because the CRT heater has to warm-up again.

9.2 POWER CONSUMPTION

Normal operation: < 140 W

Suspend mode: < 15 W

Off mode: < 5 W

9.3 DISABLING POWER MANAGEMENT FUNCTION

When power on and no horizontal and vertical sync input, the power management function is disabled.

When applying the horizontal and vertical signals, the Power Management function will be enabled.

10. Timings

Factory programmed modes include standard mode, Primary modes, and other modes.

10.1 Standard and Primary mode:

Timings listed here shall pass all of the criteria in this document.

Standard Mode: 1280 x 1024 @75Hz (Standard test condition)

Primary Mode:

- 1600 x 1200 @60Hz
- 1024 x 768 @85Hz
- 1024 x 768 @75Hz
- 800 x 600 @85Hz
- 800 x 600 @75Hz
- 640 x 480 @75Hz
- 640 x 480 @60Hz

10.2 Other Mode:

The following timings are also programmed in the memory and could be synchronized properly.

Other Mode:

- 1600 x 1200 @65Hz
- 1280 x 1024 @60Hz
- 1024 x 768 @60Hz
- 720 x 400 @70Hz

10.3 Reference Mode:

The following Apple timings are also need to be programmed in the memory and could be synchronized properly.

Reference Mode:

- 1152 x 870 @75Hz
- 832 x 624 @75Hz
- 640 x 480 @67Hz

10.3 Detailed Timings:

	Standard Mode	Primary Modes			
Format	1280x1024 75Hz	1600x1200 60Hz	1024x768 75Hz	1024x768 85Hz	
Pixel Clock	135.000MHz	158.400MHz	78.75MHz	94.5MHz	
	VESA	VESA	VESA	VESA	
Horizontal:					
Sync Polarity	P	P	P	P	
Frequency	79.976KHz	75.000KHz	60.023KHz	68.677KHz	
Total Time	12.504μs	13.333μs	16.660μs	14.561μs	
Display Time	9.481μs	10.101μs	13.003μs	10.836μs	
Sync Width	1.067μs	1.212μs	1.219μs	1.016μs	
Back Porch	1.837μs	1.616μs	2.235μs	2.201μs	
Front Porch	0.119μs	0.404μs	0.203μs	0.508μs	
Blank Time	3.022μs	3.232μs	3.657μs	3.725μs	
Vertical:					
Sync Polarity	P	P	P	P	
Frequency	75.025Hz	60.000Hz	75.029Hz	84.997Hz	
Total Time	13.329ms	16.667ms	13.328ms	11.765ms	
Display Time	12.804ms	16.000ms	12.795ms	11.183ms	
Sync Width	0.038ms	0.040ms	0.050ms	0.044ms	
Back Porch	0.475ms	0.613ms	0.466ms	0.524ms	
Front Porch	0.013ms	0.013ms	0.017ms	0.015ms	
Blank Time	0.525ms	0.667ms	0.533ms	0.583ms	

	Primary Modes			
Format	800x600 85Hz	800x600 75Hz	640x480 75Hz	640x480 60Hz
Pixel Clock	56.25MHz	49.5MHz	31.5MHz	25.175MHz
	VESA	VESA	VESA	VESA
Horizontal:				
Sync Polarity	P	P	N	N
Frequency	53.674KHz	46.875KHz	37.50KHz	31.469KHz
Total Time	18.631μs	21.333μs	26.667μs	31.778μs
Display Time	14.222μs	16.162μs	20.317μs	25.422μs
Sync Width	1.138μs	1.616μs	2.032μs	3.813μs
Back Porch	2.702μs	3.232μs	3.810μs	1.907μs
Front Porch	0.569μs	0.323μs	0.508μs	0.636μs
Blank Time	4.409μs	5.172μs	6.349μs	6.355μs
Vertical:				
Sync Polarity	P	P	N	N
Frequency	85.061Hz	75Hz	75.000Hz	59.940Hz
Total Time	11.756ms	13.333ms	13.333ms	16.683ms
Display Time	11.179ms	12.800ms	12.800ms	15.253ms
Sync Width	0.056ms	0.064ms	0.080ms	0.064ms
Back Porch	0.503ms	0.448ms	0.427ms	1.048ms
Front Porch	0.019ms	0.021ms	0.027ms	0.318ms
Blank Time	0.578ms	0.533ms	0.533ms	1.430ms

	Other Modes			
Format	1600x1200 65Hz	1280x1024 60Hz	1024x768 60Hz	720x400 70Hz
Pixel Clock	173.000MHz	110MHz	65MHz	28.3196MHz
	VESA	VESA	VESA	VESA
Horizontal:				
Sync Polarity	P	P	N	N
Frequency	81.913KHz	63.974KHz	48.363KHz	31.466KHz
Total Time	12.208μs	15.631μs	20.677μs	31.78μs
Display Time	9.249μs	11.797μs	15.754μs	25.424μs
Sync Width	1.110μs	1.18μs	2.092μs	3.813μs
Back Porch	1.480μs	2.065μs	2.462μs	1.907μs
Front Porch	0.370μs	0.59μs	0.369μs	0.636μs
Blank Time	2.960μs	3.834μs	4.923μs	6.356μs
Vertical:				
Sync Polarity	P	P	N	P
Frequency	65.530Hz	60.013Hz	60.004Hz	70.081Hz
Total Time	15.260ms	16.663ms	16.666ms	14.269ms
Display Time	14.650ms	16.006ms	15.880ms	12.712ms
Sync Width	0.037ms	0.047ms	0.124ms	0.064ms
Back Porch	0.562ms	0.594ms	0.600ms	1.112ms
Front Porch	0.012ms	0.016ms	0.062ms	0.381ms
Blank Time	0.610ms	0.657ms	0.786ms	1.557ms

	Reference Modes		
Format	1152x870 75Hz	832x624 75Hz	640x480 67Hz
Pixel Clock	100.000MHz	57.272MHz	30.24MHz
	APPLE	APPLE	APPLE
Horizontal:			
Sync Polarity	N	N	N
Frequency	68.681KHz	49.715KHz	35.000KHz
Total Time	14.560μs	20.114μs	28.57μs
Display Time	11.520μs	14.53μs	21.16μs
Sync Width	1.280μs	1.12μs	2.12μs
Back Porch	1.440μs	3.91μs	3.31μs
Front Porch	0.320μs	0.56μs	1.98μs
Blank Time	3.040μs	5.59μs	7.41μs
Vertical:			
Sync Polarity	N	N	N
Frequency	75.062Hz	74.54Hz	66.667Hz
Total Time	13.322ms	13.42ms	15.000ms
Display Time	12.667ms	12.555ms	13.714ms
Sync Width	0.044ms	0.06ms	0.086ms
Back Porch	0.568ms	0.785ms	1.114ms
Front Porch	0.044ms	0.02ms	0.086ms
Blank Time	0.655ms	0.865ms	1.286ms

Chapter Four : Entry Reference

1. Warning

Some test points are critically dangerous. You have to be very careful with electric shock when you repair.

CRT Anode

Be careful of the high voltage, about 24.5KV to 29KV when touching the FBT red rubber protecting cover. When it becomes loose or broken, please replace it with a new one. Make sure to connect a Hi-Voltage probe to your multimeter and have a good ground while measuring the CRT anode voltage.

Flyback Transformer (FBT) :

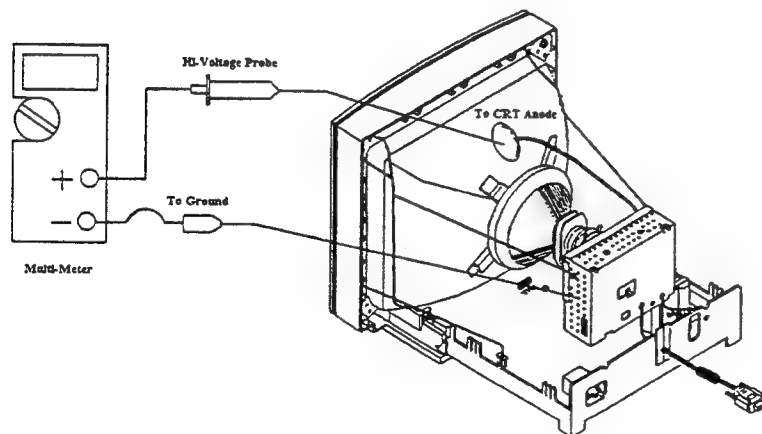
FBT is a main Hi-Voltage and Horizontal deflection generator. The voltage nearby could be higher than 1.2 KV.

Horizontal Deflection York :

Pay attention, as the voltage can be as high as 1.2 KV.

Power Supply Circuit :

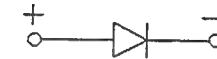
Pay attention to the high current in the supply circuit.



2. How to Test Diode & Transistor

When you test diode and transistor, you could refer the values below to know if they work or not.

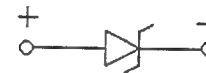
1. Diode :



$V_F = 0.5-0.7$
 $V_R = \text{OPEN}$

F: Forward - Bias
R: Reverse - Bias

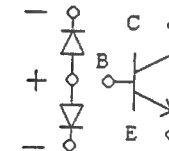
2. ZENER Diode :



$V_F = 0.7-0.8$
 $V_R = \text{OPEN}$

F: Forward - Bias
R: Reverse - Bias

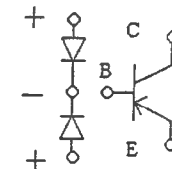
3. BJTs (Bipolar Junction Transistors) PNP TYPE



$V_{EB} = 0.4-0.6$
 $V_{CB} = 0.4-0.6$

V_{EB} = Emitter - Base Bias
 V_{CB} = Collector - Base Bias

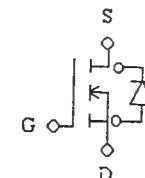
4. BJTs (Bipolar Junction Transistors) PNP TYPE



$V_{EB} = 0.4-0.6$
 $V_{CB} = 0.4-0.6$
Otherwise: OPEN

V_{EB} = Emitter - Base Bias
 V_{CB} = Collector - Base Bias

5. MOS FETs (Metal-Oxide Semiconductor Field-Effect Transistor)



$V_{DS} = 0.4-0.6$
Otherwise: OPEN

3. Error Code Description

A. Electric R.

ITEM	Error Code	Description
1	ENP	No power supply, and the power LED is off
2	ENR	No raster or background light, but power LED is on
3	ENV	No video, but has raster
4	EON	Continuous power ON-OFF problem with click sound and flashing power LED.
5	EPA	Abnormal power saving function.
6	EBN	Smoking problem with component or PCB burned out
7	EAN	Sound with low hum or sharp scream

B. Display Region

ITEM	Error Code	Description
1	EEV	Single vertical line shown on screen. (No horizontal deflection)
2	EEH	Single horizontal line shown on screen. (No vertical deflection)
3	ESV	Unsynchronized vertical sync, usually the video rolls up continuously
4	ESH	Unsynchronized horizontal sync, usually a lot of irregular lines on screen
5	EPS	Poor shock problem. When pounding on housing, there is something wrong shown on screen.
6	EPJ	Jitters problem with unstable picture
7	EFO	Focus problem with blurred or not clear characters on screen.
8	ECG	Convergence problem. The R,G,B lines don't meet at one white line.
9	EPU	Impurity of R,G,B color, not uniform color display
10	EPD	CRT blemish with black or color spots on screen or bubbles on CRT surface.
11	EWH	Abnormal horizontal size.
12	EWV	Abnormal vertical size.
13	EPF	Continuous picture shrinking and widening in horizontal size or vertical size.
14	EPH	Abnormal horizontal phase shift. The video cannot be set on the middle of screen.
15	EPV	Abnormal vertical position shift. The video cannot be set on the middle of screen.

C. Picture Distortion

ITEM	Error Code	Description
1	EDP	Pincushion or Barrel distortion.
2	EDS	S-curve distortion.
3	EDT	Tilt distortion.
4	ELH	Horizontal linearity problem.
5	ELV	Vertical linearity problem.

D. Brightness & Color Symptoms

ITEM	Error Code	Description
1	EBR	Abnormal raster brightness (too bright or too dim)
2	EBL	Abnormal retraced white line on screen.
3	ESE	Spot killer. A bright spot shown on screen while you turn off monitor.
4	EPL	Unstable brightness of raster or video.
5	ELR	No red or abnormal red.
6	ELG	No green or abnormal green.
7	ELB	No blue or abnormal blue.
8	EWB	Abnormal white balance.

E. VR, SW & Connector Functions

ITEM	Error Code	Description
1	EVB	Abnormal " Brightness VR " function..
2	EVC	Abnormal " Contrast VR " function.
3	EVH	Abnormal " Horizontal Size Key " function.
4	EVP	Abnormal " Horizontal Phase Key " function
5	EVS	Abnormal " Vertical Size Key " function.
6	EVV	Abnormal " Vertical Position Key " function.
7	EVN	Abnormal " Pincushion Key " function.
8	EVT	Abnormal " Trapezoid Key " function.
9	EMG	Abnormal " Degaussing Key " function
10	EMN	Abnormal " BNC/D-SUB Switch " function.
11	EMH	Abnormal " 75W/Hi-R Switch " function.
12	EMP	Abnormal " Preset / User Switch " function.
13	EMR	Abnormal " Recall Button " function.
14	EVG	Abnormal " CG VR " function.

F. LCD, LED Functions

ITEM	Error Code	Description
1	EMD	Incorrect timing display on LCD or LED.
2	EML	No display or incorrect display on LCD.
3	EMM	Poor memory or programming function.

G. Outlook Regions

ITEM	Error Code	Description
1	MP6	Housing(front bezel, back cover)is scratched or injured.
2	MP16	CRT is scratched.

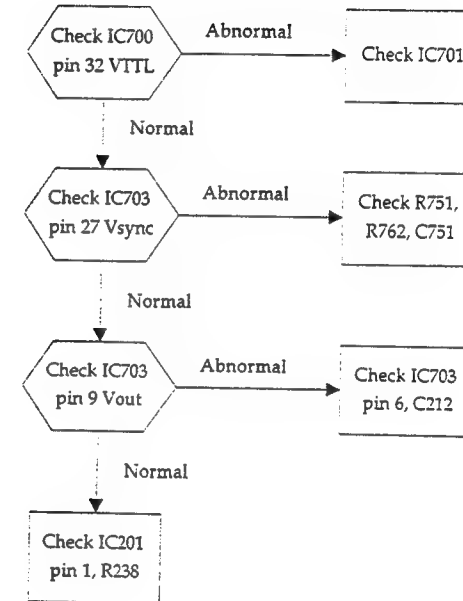
H. Repairing Code

ITEM	R Code	Description
1	A	Incorrect component embedded.
2	B	Lack of component.
3	C	Defective component.
4	N	Cold-soldered.
5	Q	PCB trace broken.
6	O	Short between pins by improper soldering.
7	R	Loosen connector or dropped connector.
8	V	Defective wire or harness.
9	@	Only alignment problem.
10	#	Checking O.K.

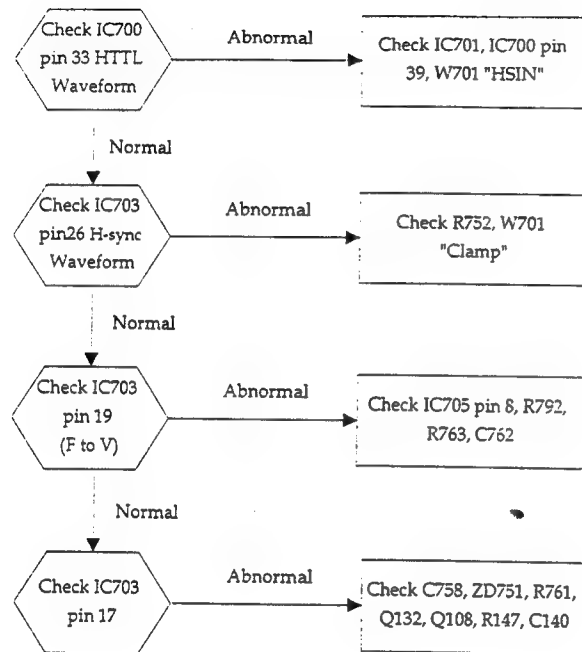
Chapter Five : Trouble Shooting

1. Trouble Shooting

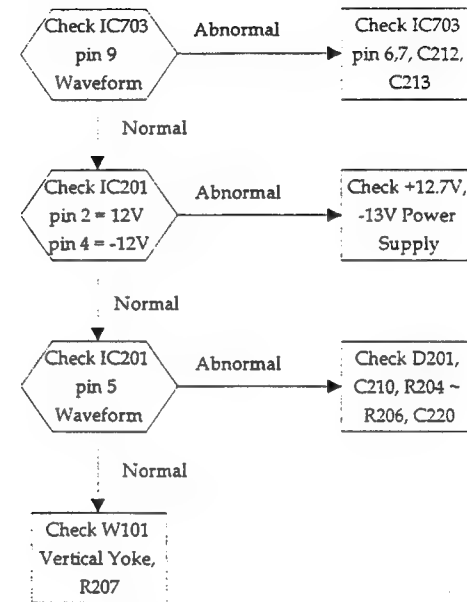
1.1 Vertical cannot synchronize



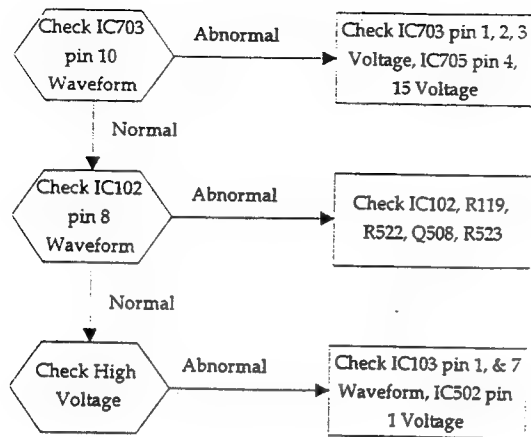
1.2 Horizontal cannot synchronize



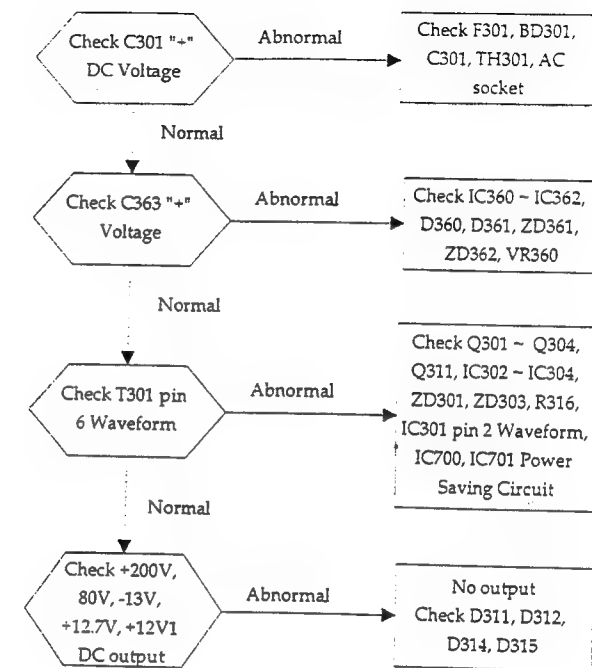
1.3 Single Horizontal Line



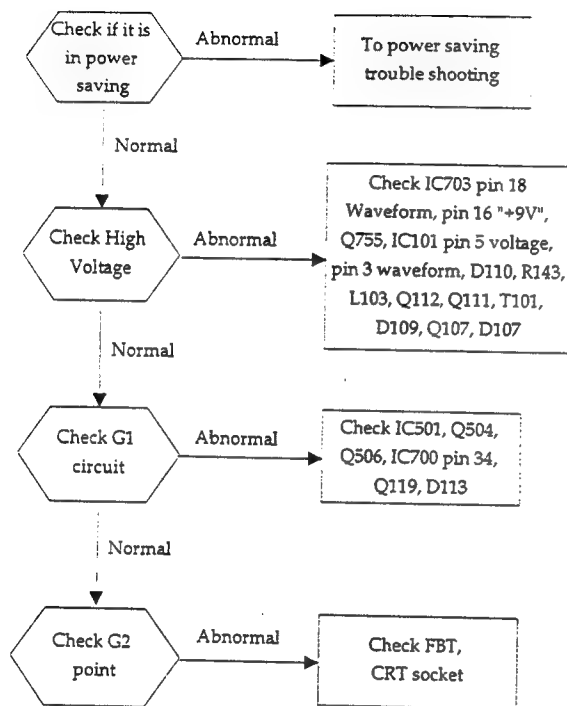
1.4 Pincushion & Distortion



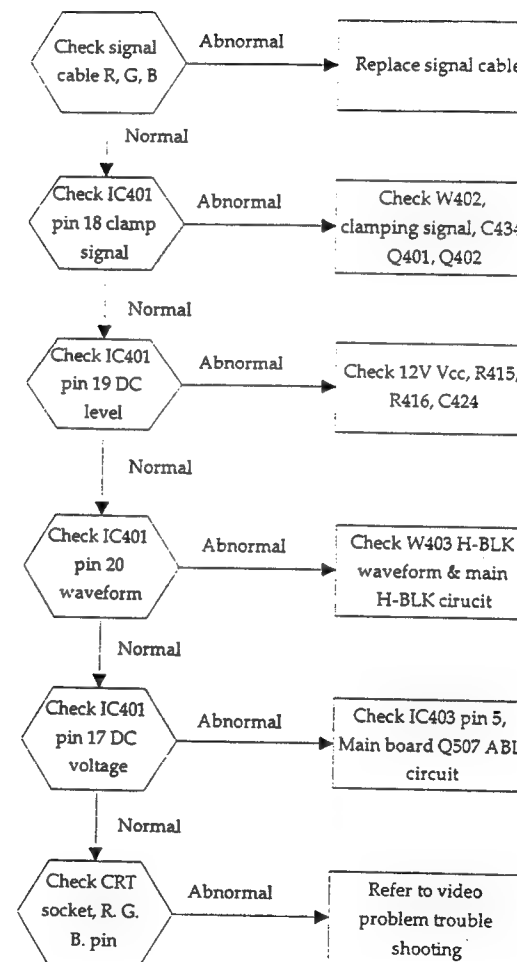
1.5 Power Supply Problem



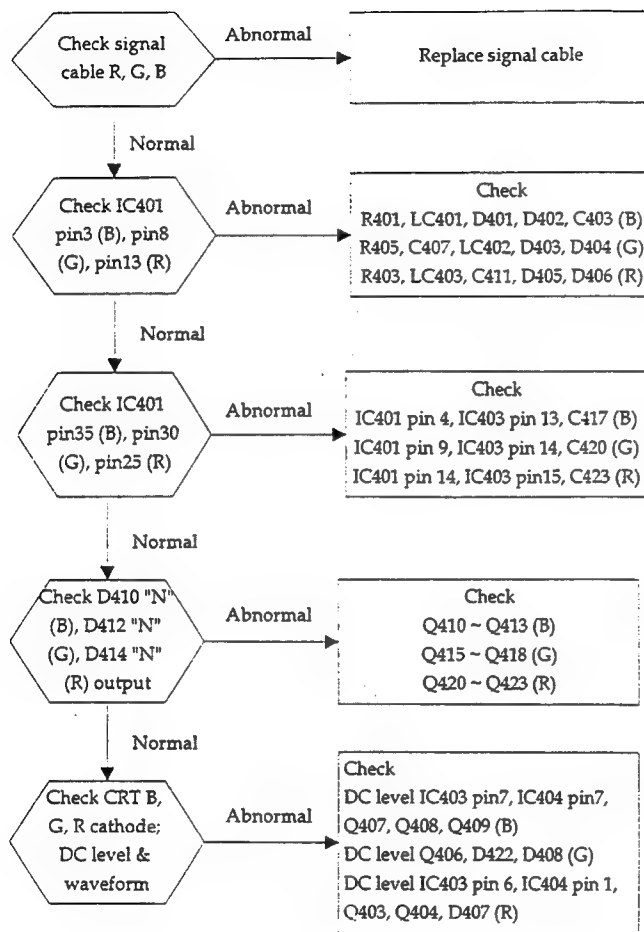
1.6 Raster does not appear



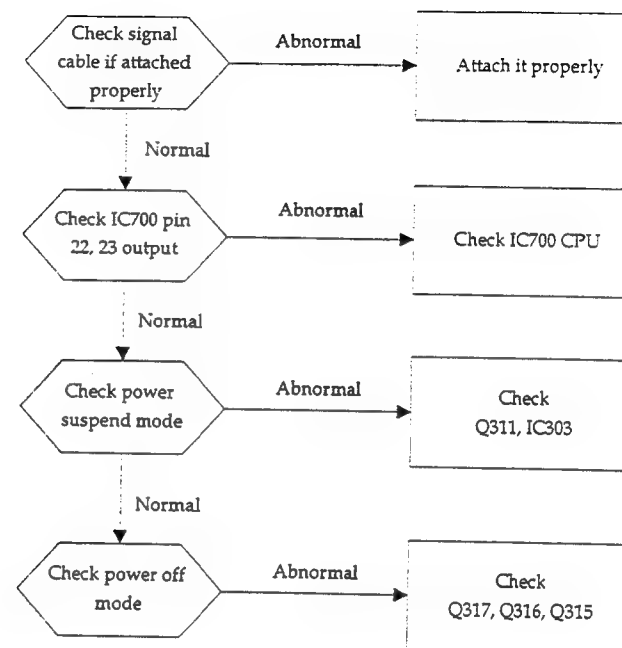
1.7 No Video but has Raster



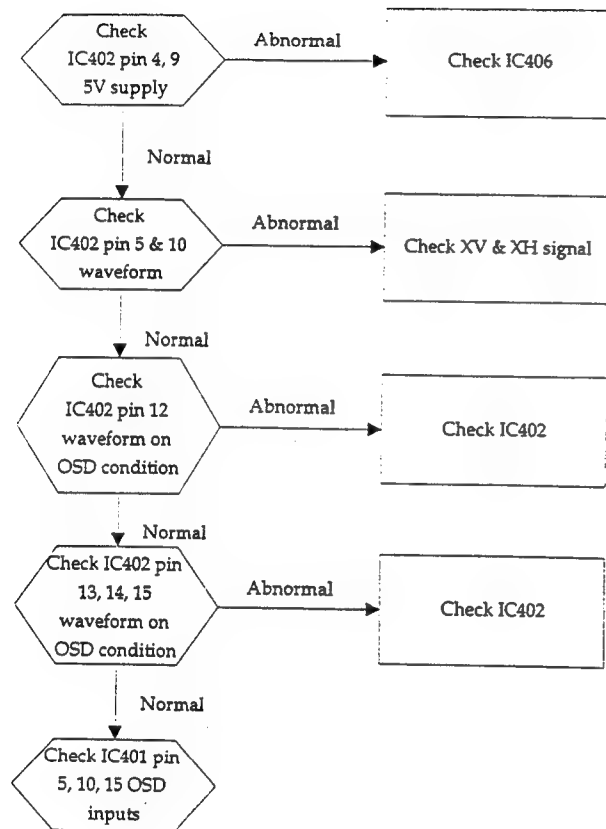
1.8 Video R, G, B color problem



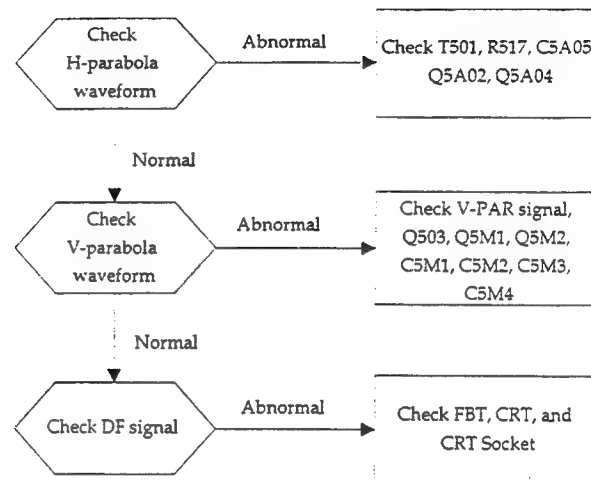
1.9 Power Saving Problem



1.10 OSD Related Problem



1.11 Dynamic Focus Problem



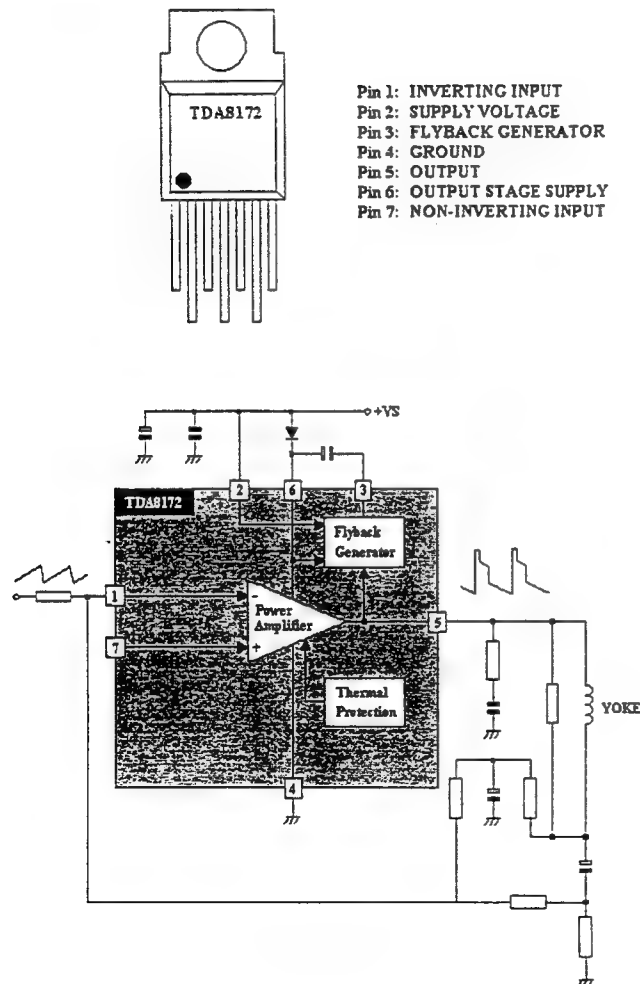
2. Component Pin Assignment

TDA8172

Description

The TDA8172 is a monolithic integrated circuit in HEPTAWATT™ package. It is a high efficiency power booster for direct driving of vertical windings of TV yokes. It is intended for use in Color and B & W television as well as in monitors and displays.

Block Diagram



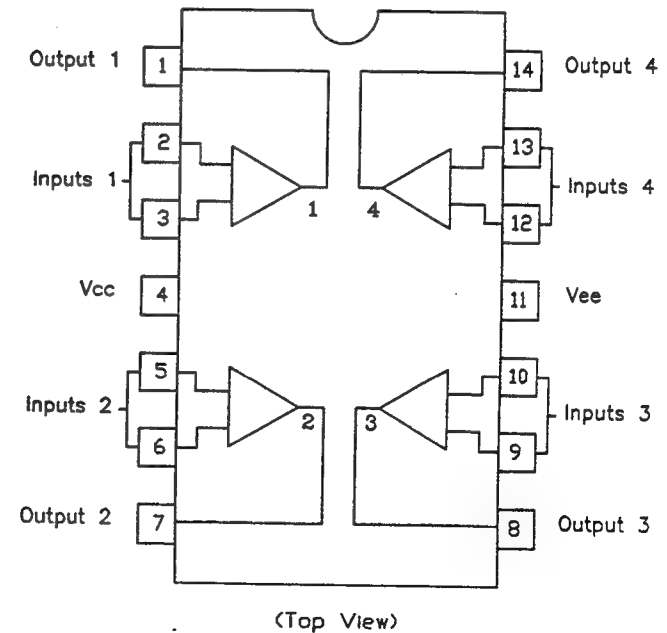
ii LM324

QUAD Low Power Operational Amplifiers

The LM324 series are low-cost, quad operational amplifiers with true differential inputs. These have several distinct advantages over standard operational amplifier types in single supply applications. The quad amplifier can operate at supply voltage as low as 3.0 Volts or as high as 32 Volts with quiescent currents about one fifth of those associated with the MC1741 (on a per amplifier basis). The common mode input range includes the negative supply, thereby eliminating the necessity for external biasing components in many applications. The output voltage range also includes the negative power supply voltage.

- * Short Circuited Protected Outputs
- * True Differential Input Stage
- * Single Supply Operation: 3.0 to 32 Volts
- * Low Input Bias Currents: 100 nA Max
- * Four Amplifiers Per Package
- * Internally Compensated
- * Common Mode Range Extends to Negative Supply
- * Industry Standard Pinouts

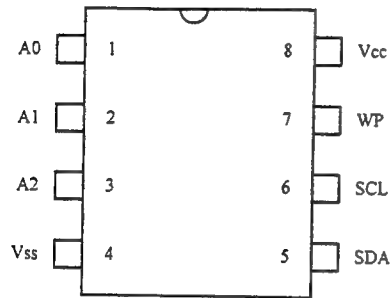
Pin connection



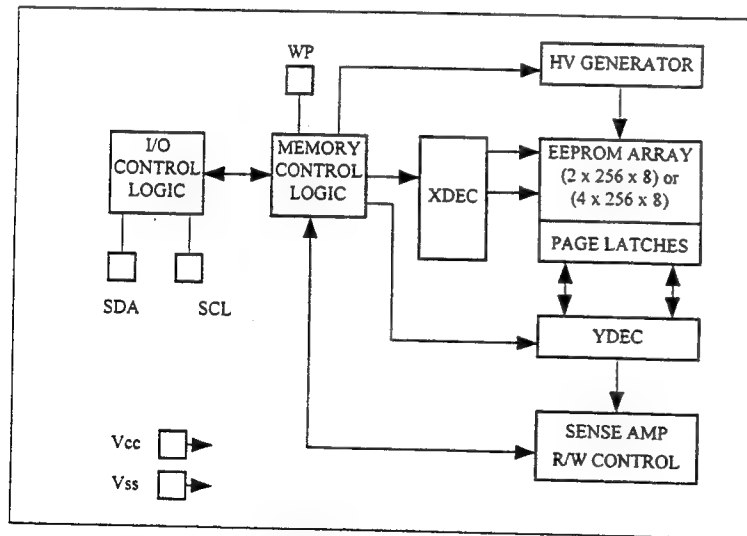
iii 24LC08

Description

24LC08 is a 8K-bit Electrically Erasable PROM. The device is organized as two or four blocks of 256 x 8 bit memory with two wire serial interface. Low voltage design permits operation down to 2.5 volts with standby and active currents of only 5µA and 1mA respectively. The 24LC08 also has a page-write capability for up to 16 bytes of data.



Block Diagram



iv 74LS74 Dual D-Type Positive Edge-Triggered Flip-Flop

Description

The 74LS74 dual edge-triggered flip-flop utilizes schottky TTL circuitry to produce high speed D-type flip-flops. It has individual clear and set inputs, and also complementary Q and \bar{Q} outputs.

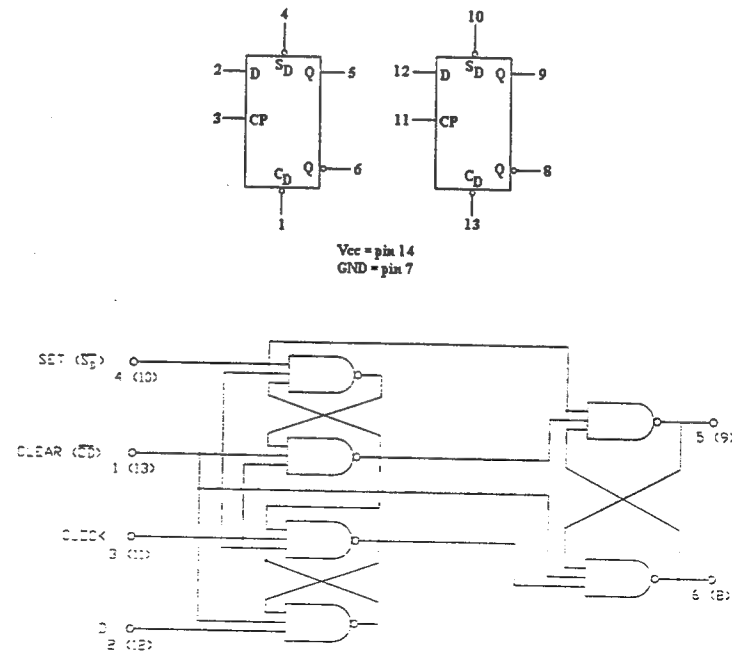
Information at input D is transferred to the Q output on the positive-going edge of the clock pulse and is not directly related to the transition time of the positive-going pulse. When the clock input is at either the HIGH or the LOW level, the D input signal has no effect.

Mode Select - Truth Table

Operating Mode	Inputs			Outputs	
	\bar{S}_0	\bar{S}_1	D	Q	\bar{Q}
Set	L	H	X	H	L
Reset (Clear)	H	L	X	L	H
Undetermined	L	L	X	H	H
Load "1" (Set)	H	H	h	H	L
Load "0" (Reset)	H	H	l	L	H

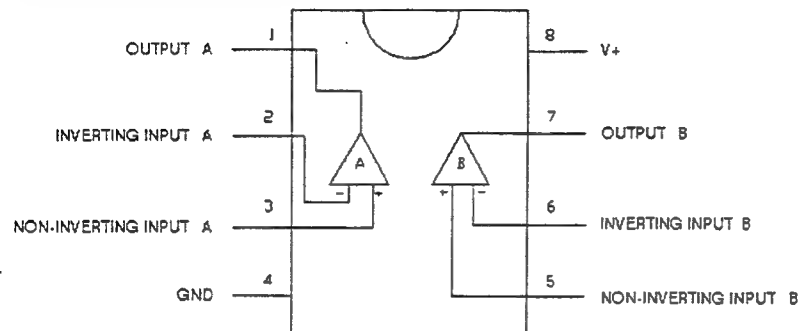
- H, h = HIGH Voltage Level
- L, l = LOW Voltage Level
- X = Don't Care
- l, h (q) = Lower case letters indicate the state of the referenced input (or output) one set-up time prior to the HIGH to LOW clock transition.

Logic Symbol



v

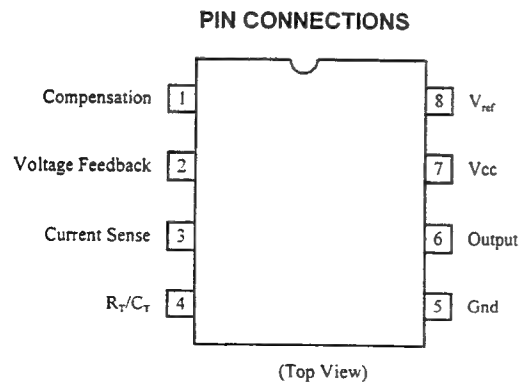
Application areas include transducer amplifiers, DC gain blocks and all the conventional op amp circuits which now can be more easily implemented in single supply system.

 \mathbf{y}^{\dagger}

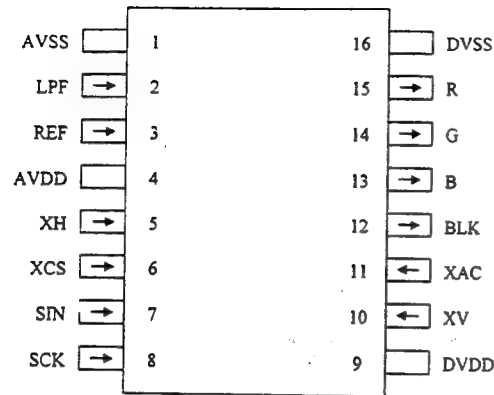
Description

The UC3842 provides the necessary features to implement off-line or DC to DC fixed frequency current mode control schemes with a minimal external parts count. Internally implemented circuits include under voltage lockout featuring start-up current less than 1 mA, a precision reference trimmed for accuracy at the error amp input, logic to insure latched operation, a PWM comparator which also provides current limit control, and a totem pole output stage designed to source or sink high peak current.

Pin assignment



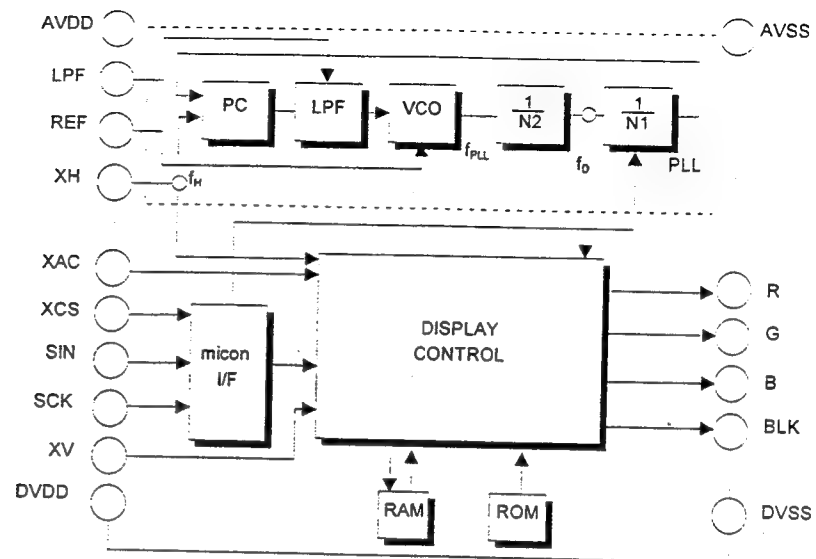
Terminal Functions



TOP VIEW

The arrows show the directions of terminal input and output.

PIN	Symbol	Name	Description
1.	AVSS	Power supply	Analog circuit ground pin
2.	LPF	External LPF	For external attachment of low-pass filter
3.	REF	Frequency control	For determining VCO free run frequency.
4.	AVDD	Power supply	Analog circuit power supply pin
5.	XH	Horizontal sync signal	For entry of horizontal sync signal using negative logic.
6.	XCS	Chip select	'L' when serial communication is performed
7.	SIN	Serial data	For providing data when serial communication is performed
8.	SCK	Serial clock	For providing a clock signal when serial communication is performed. Reads the SIN value at the rising edge.
9.	DVDD	Power supply	Digital circuit power supply pin
10.	XV	Vertical sync signal	For entry of vertical sync signal using negative logic
11.	XAC	All clear	Initializes IC using 'L'
12.	BLK	Blanking output	For output of blanking timing using positive logic
13.	B	Blue output	For output of blue timing using positive logic
14.	G	Green output	For output of green timing using positive logic
15.	R	Red output	For output of red timing using positive logic
16.	DVSS	Power supply	Digital circuit ground pin

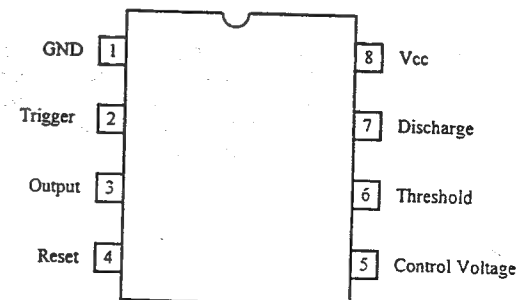


ix NE555

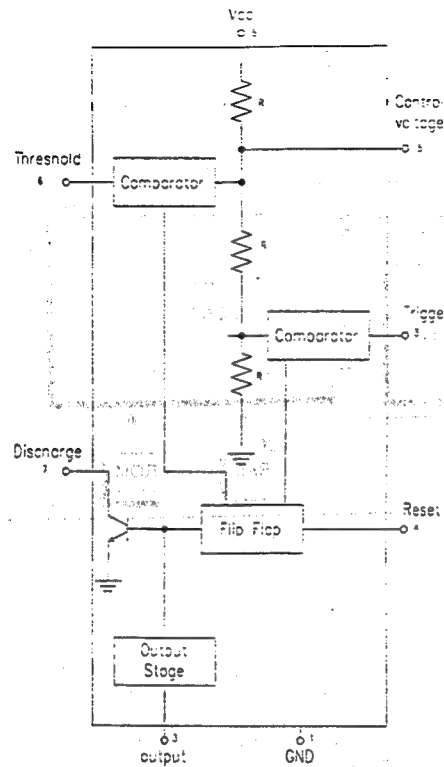
Description

The 555 monolithic timing circuit is a highly stable controller capable of producing accurate time delays, or oscillation. In the time delay mode of operation, the time is precisely controlled by one external resistor and capacitor. For a stable operation as an oscillator, the free running frequency and the duty cycle are both accurately controlled with two external resistors and one capacitor. The circuit may be triggered and reset on falling waveforms, and the output structure can source or sink up to 200mA.

Pin Configuration



Pin Connection

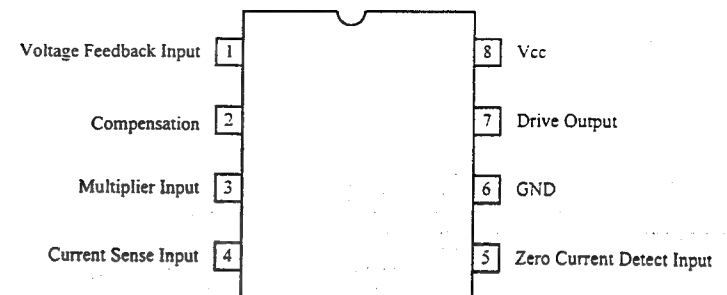


x MC34261

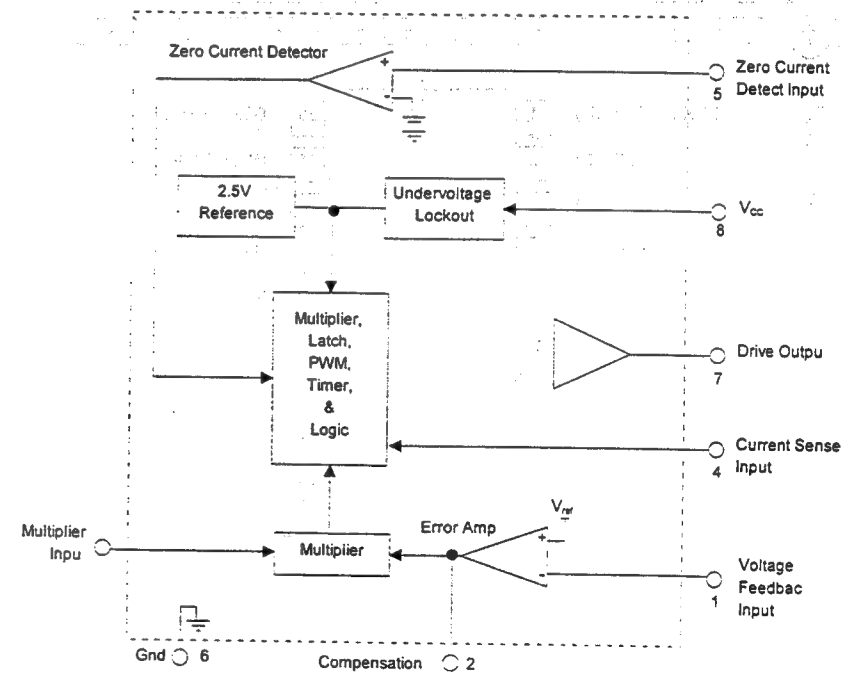
Description

The MC34261 is an active power factor controller specifically designed for use as a preconverter in electronic ballast and in off-line power converter applications. These integrated circuits feature an internal start-up timer, a one quadrant multiplier for near unity power factor, zero current detector to ensure critical conduction operation, high gain error amplifier, trimmed internal bandgap reference, current sensing comparator, and a totem pole output ideally suited for driving a power MOSFET.

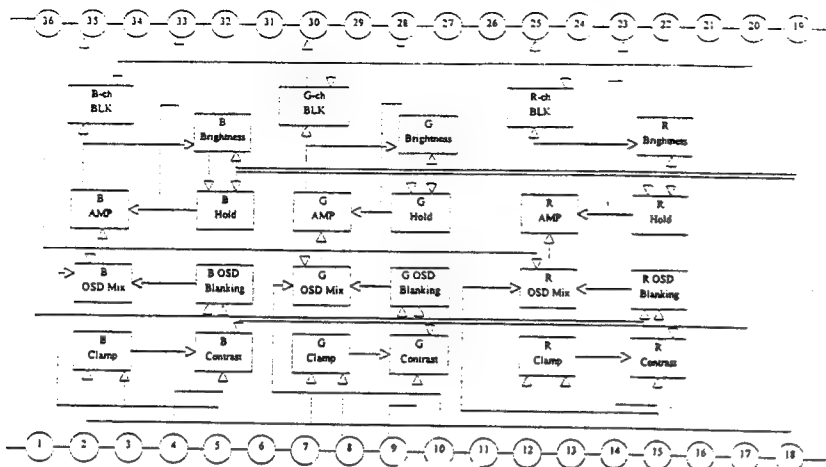
Also included are protective features consisting of input undervoltage lockout with hysteresis, cycle-by-cycle current limiting, and a latch for single pulse metering. These devices are available in dual-in-line and surface mount plastic packages.



Block Diagram



xi M52737SP



BLK IN (for OSD)	1	36	OSD adjust
VCC1 (B)	2	35	OUTPUT (B)
INPUT (B)	3	34	VCC2 (B)
Sub contrast (B)	4	33	Hold (B)
OSD IN (B)	5	32	NC
GND 1 (B)	6	31	GND 2 (B)
VCC1 (G)	7	30	OUTPUT (G)
INPUT (G)	8	29	VCC2 (G)
Sub contrast (G)	9	28	Hold (G)
OSD IN (G)	10	27	NC
GND 1 (G)	11	26	GND2 (G)
VCC1 (R)	12	25	OUTPUT (R)
INPUT (R)	13	24	VCC2 (R)
Sub contrast (R)	14	23	Hold (R)
OSD IN (R)	15	22	NC
GND 1 (R)	16	21	GND 2 (R)
Main contrast	17	20	BLK IN (for retrace)
CP IN	18	19	Main brightness

xii UPC1883CT

Description

The UPC1883 is a horizontal and vertical sync. signal processor with geometry compensation circuit for MultiSync display.

Horizontal and vertical sync. signal processing and geometry compensation for MultiSync Display are incorporated on one chip. These functions are controlled by DC voltage, so it's very easy to interface with microprocessor and D/A converter.

And components and peripheral circuits required for horizontal oscillator, horizontal delay circuit, vertical blanking and horizontal clamping circuit are incorporated. Therefore, application design is easy.

Pin Configuration

Side Pin Corner Correction Setting	1	SPC	HGND	30	Horizontal GND
Trapezoid Correction Setting	2	TRP	BLKO	29	Vertical Blanking/Clamp Pulse & Vertical Blanking Output
Side Pin Correction Setting	3	SDP	HPDO	28	Horizontal Phase Distortion Output
Parallelogram Correction Setting	4	PAR	VSI	27	Vertical Sync. Signal Input
Side Pin Balance Correction Setting	5	SDPB	HSI	26	Horizontal Sync. Signal Input
Vertical Oscillator Capacitor	6	VOSCC	HP	25	Horizontal Sync. Delay Setting
Vertical AGC Filter	7	VAGCC	HAFC	24	Horizontal AFC Filter
Vertical Saw Wave Amplitude Setting	8	VS	DUTY	23	Horizontal Duty Setting
Vertical Saw Wave Output	9	VSAWO	OSCFIL	22	Horizontal Oscillation Filter
E/W Output	10	EWO	FVC	21	F/V Delay Capacitor
Vertical Center DC Voltage Input	11	VP	FVR	20	F/V Current Conversion Reference Resistor
Vertical "S" Curve Correction Setting	12	VLS	FVI	19	F/V Voltage Input
Vertical "C" Curve Correction Setting	13	VLC	HOUT	18	Horizontal Output
Reference Voltage Output	14	VREF	FBPI	17	Horizontal Flyback Pulse Input
Vertical GND	15	VGND	Vcc	16	Power Supply

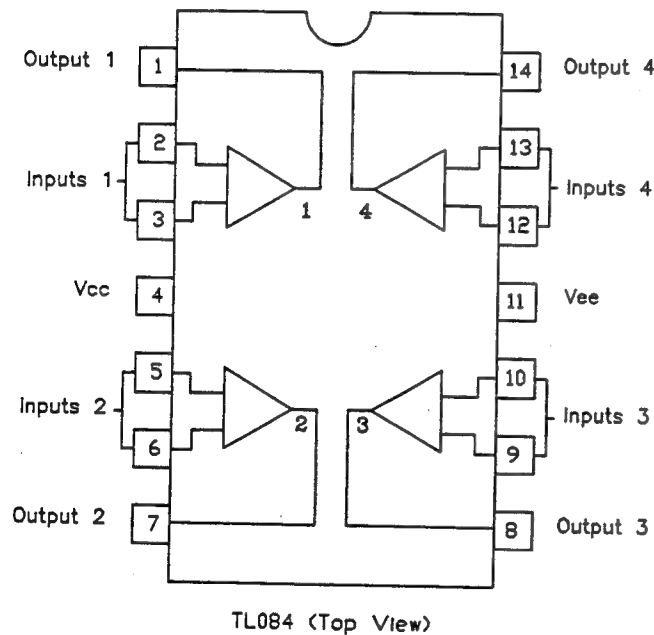


xiv TL084

JFET Input Operational Amplifiers

These low-cost JFET input operational amplifiers combine two state-of-the-art linear technologies on a signal monolithic integrated circuit. Each internally compensated operational amplifier has well matched high voltage JFET input devices for low input offset voltage. The BIFET technology provides wide bandwidths and fast slew rates with low input bias current, input offset currents, and supply currents.

Pin connection

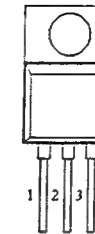


xv MC79XX Series

Description

The MC79XX series of fixed output negative voltage regulators are intended as complements to the popular MC7800 series devices. These negative regulators are available in the same seven-voltage options as the MC7800 devices. In addition, one extra voltage option commonly employed in MECL systems is also available in the negative MC79XX series.

Available in fixed output voltage options from -5.0 to -24 volts, these regulators employ current limiting, thermal shut-down, and safe-area compensation – making them remarkably rugged under most operating conditions. With adequate heat-sinking they can deliver output currents in excess of 1.0 ampere.



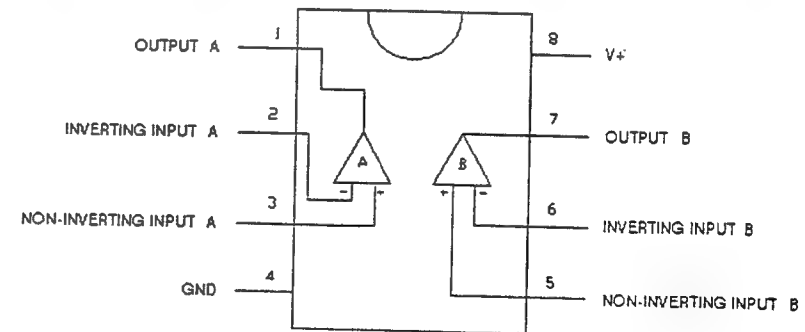
Pin 1: GND
Pin 2: Input
Pin 3: Output

xvi LM2903

Description

The LM2903 consists of two independent precision voltage comparators with an offset voltage specification as low as 2.0 mV max. for two comparators which were designed specifically to operate from a single power supply over a wide range of voltages. Operation from split power supplies is also possible and the low power supply current drain is independent of the magnitude of the power supply voltage. The comparator also has a unique characteristic in that the input common-mode voltage range includes ground, even though operated from a single power supply voltage.

Application areas include limit comparators, simple analog to digital converters; pulse, squarewave and time delay generators; wide range VCO; MOS clock timers; multivibrators and high voltage digital logic gates. The LM2903 was designed to directly interface with TTL and CMOS. When operated from both plus and minus power supplies, the LM2903 will directly interface with MOS logic where their low power drain is a distinct advantage over standard comparators.



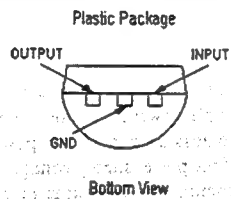
xvii LM78LXX Series 3-Terminal Positive Regulators

Description

The LM78LXX series of three terminal positive regulators is available with several fixed output voltages making them useful in a wide range of applications. When used as a zener diode/resistor combination replacement, the LM78LXX usually results in an effective output impedance improvement of two orders of magnitude, and lower quiescent current. These regulators can provide local on card regulation, eliminating the distribution problems associated with single point regulation. The voltages available allow the LM78LXX to be

used in logic systems, instrumentation, HiFi, and other solid state electronic equipment. Although designed primarily as fixed voltage regulators these devices can be used with external components to obtain adjustable voltages and currents.

The LM78LXX is available in the metal three lead TO-39 (H), the plastic TO-92 (Z), and SO-8 plastic. With adequate heat sinking the regulator can deliver 100 mA output current. Current limiting is included to limit the peak output current to a safe value. Safe area protection for the output transistors is provided to limit internal power dissipation. If internal power dissipation becomes too high for the heat sinking provided, the thermal shutdown circuit takes over preventing the IC from overheating.



3. Waveform

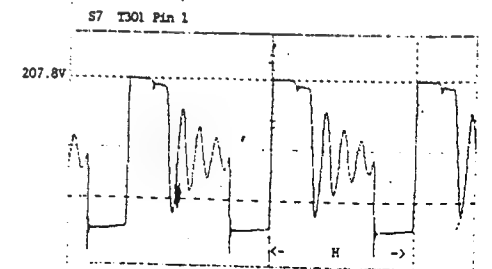
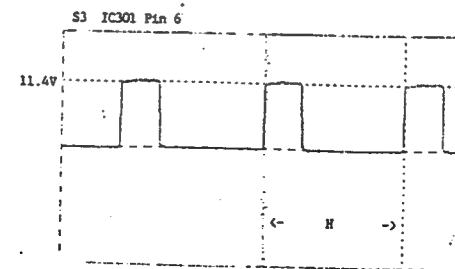
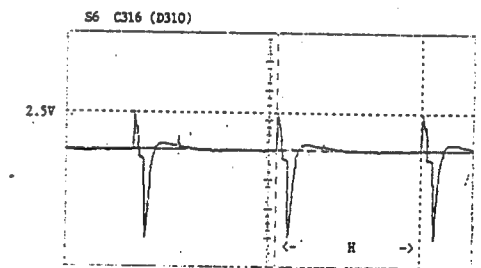
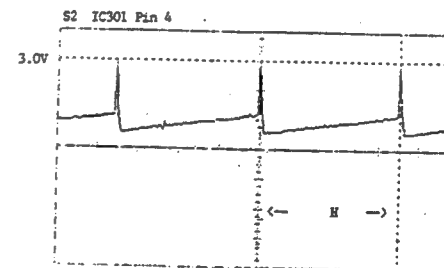
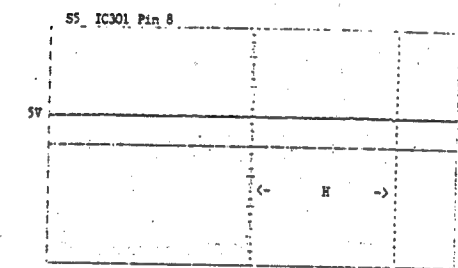
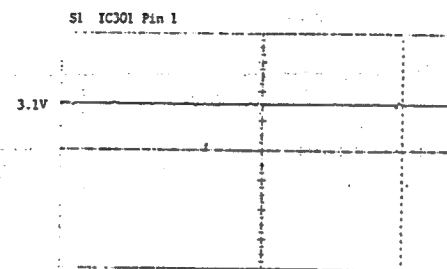
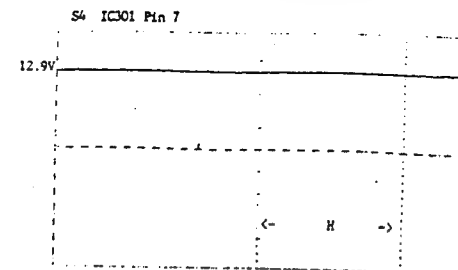
Test Condition:

H = 79.976 KHz

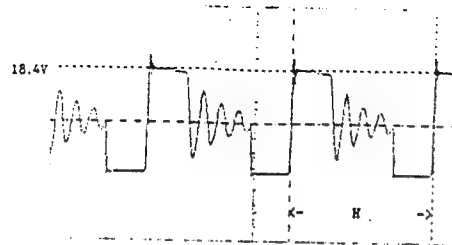
V = 75.025 Hz

Resolution = 1280 x 1024

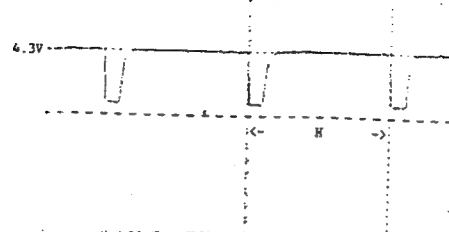
All in full white pattern



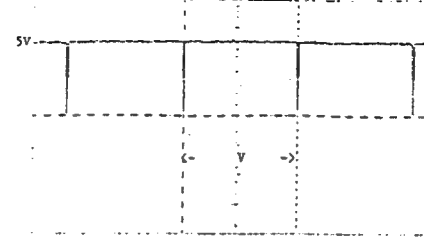
S8 T301 Pin 11



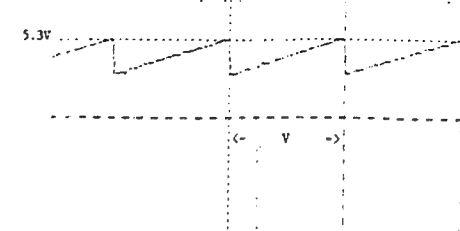
S12 IC702 Pin 11



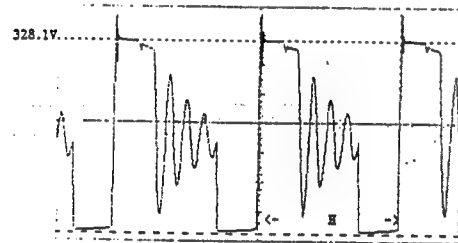
S16 IC700 Pin 32



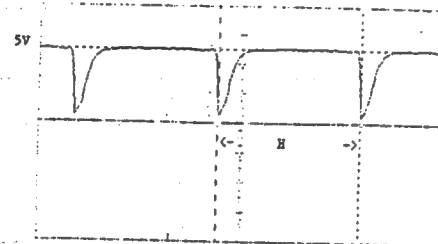
S20 IC703 Pin 6



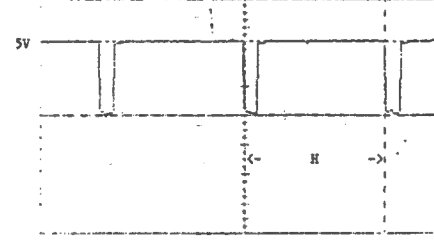
S9 T301 Pin 14



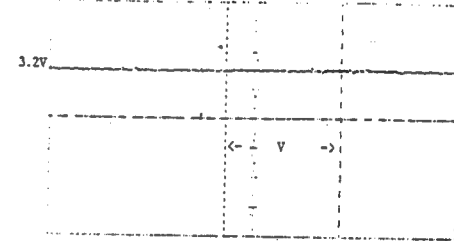
S13 IC702 Pin 13



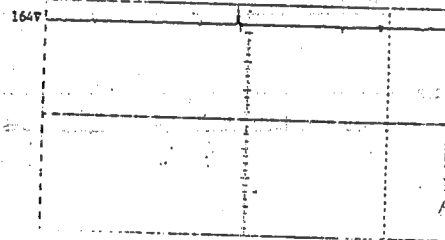
S17 IC700 Pin 33



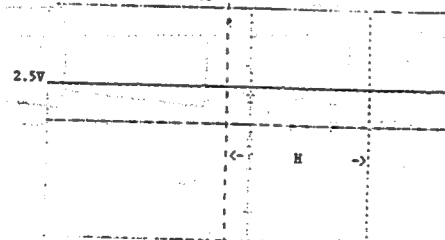
S21 IC703 Pin 7



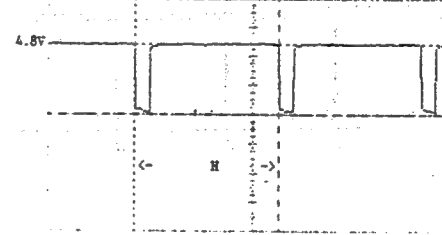
S10 T301 Pin 16



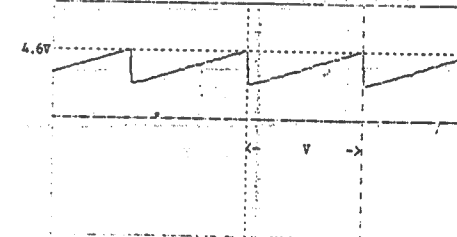
S14 IC304 Reference



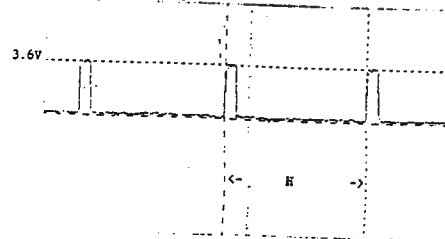
S18 IC700 Pin 39



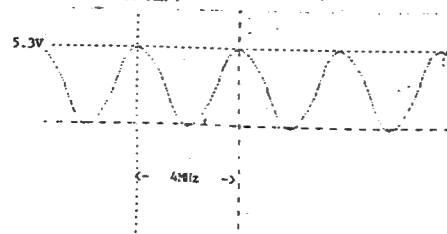
S22 IC703 Pin 9



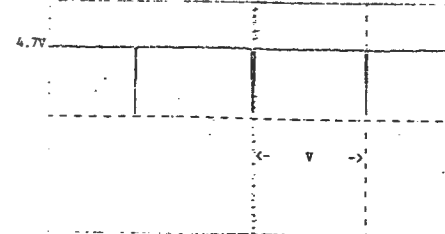
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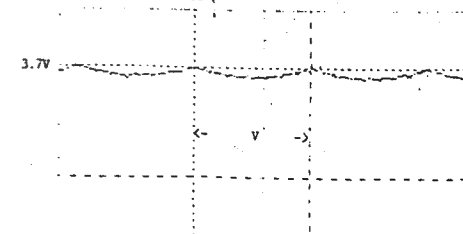
S15 IC700 Pin 7



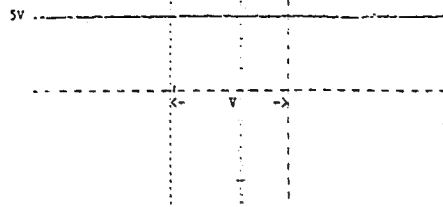
S19 IC700 Pin 40



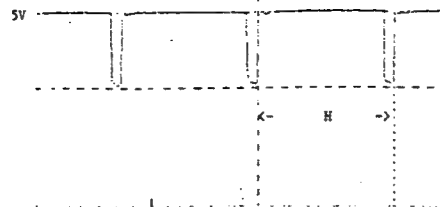
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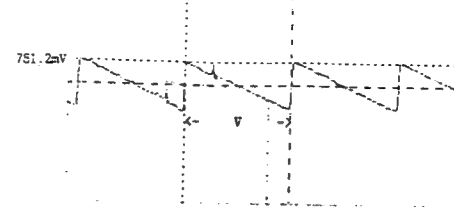
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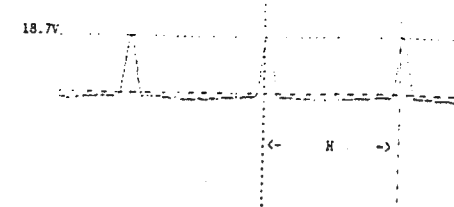
S28 IC703 Pin 18



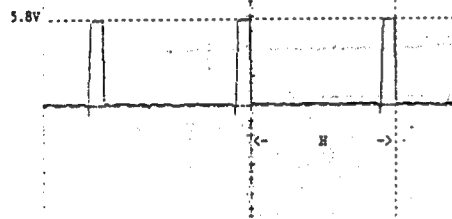
S32 W101 (R205)



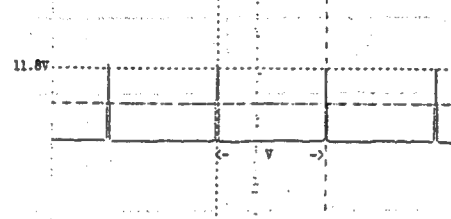
S36 T102 Pin 4



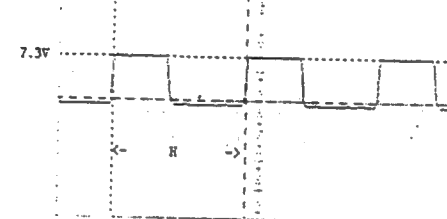
S25 IC703 Pin 17



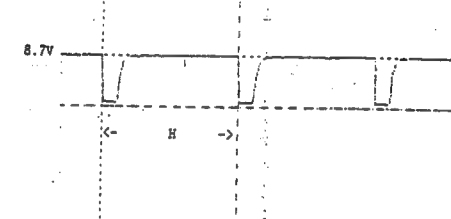
S29 IC201 Pin 3



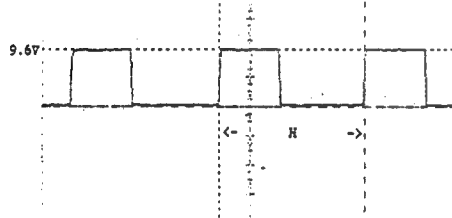
S33 Q111 Gate



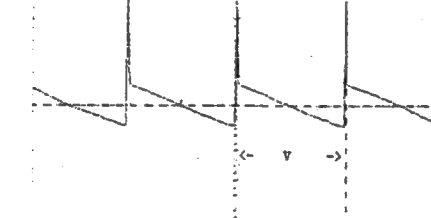
S37 Q108 Emitter



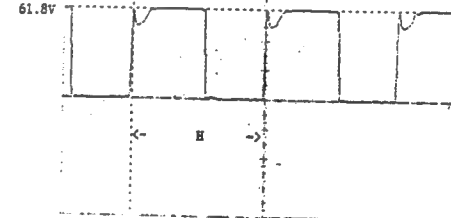
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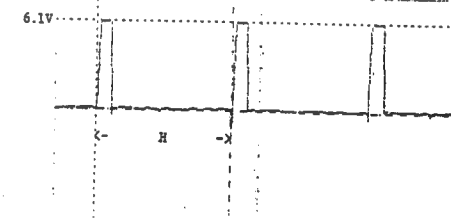
S30 IC201 Pin 5



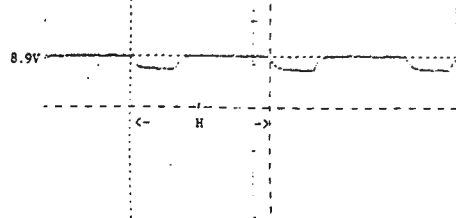
S34 Q111 Drain



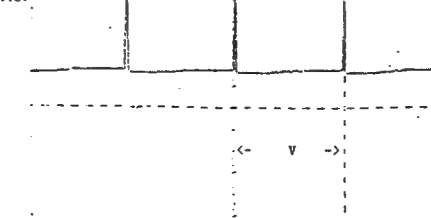
S38 Q132 Collector



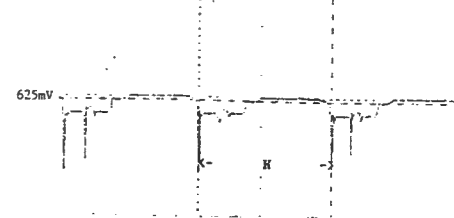
S27 IC703 Pin 22



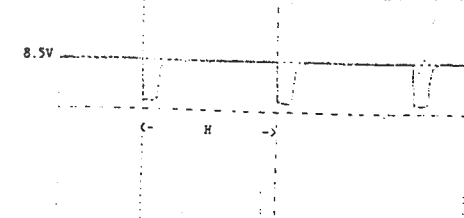
S31 IC201 Pin 6



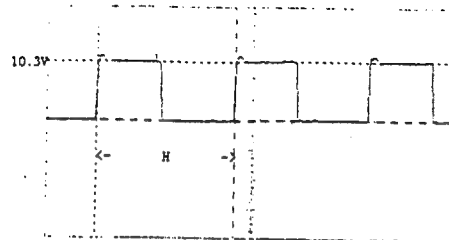
S35 Q112 Base



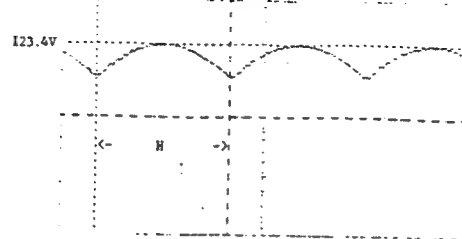
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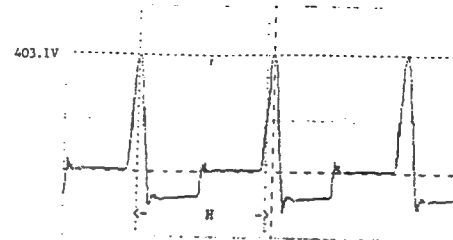
S40 IC101 Pin 3



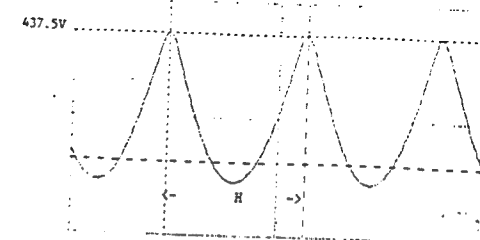
S44 V-PARA



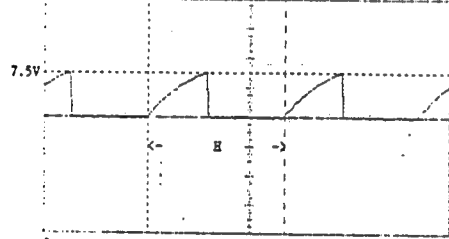
S48 FB1 Pin 5



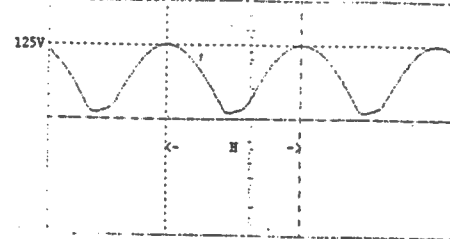
S52 FB1 Pin 12



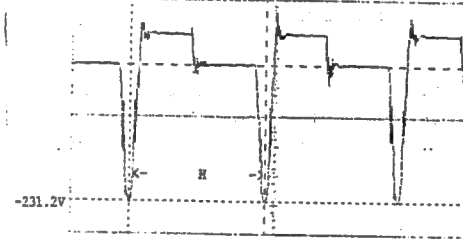
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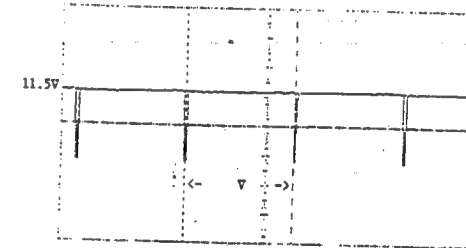
S45 Q503 Collector



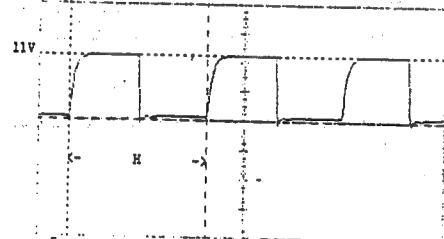
S49 FB1 Pin 7



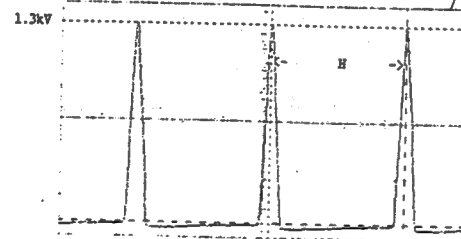
S53 V-BLK1



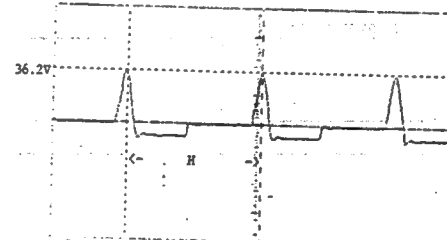
S42 Q129 Emitter



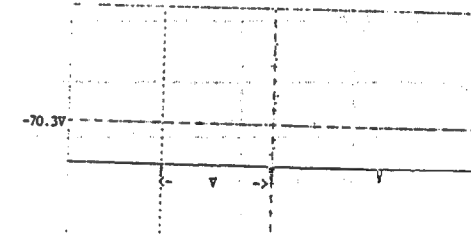
S46 FB1 Pin 1



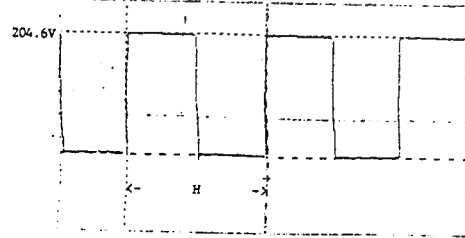
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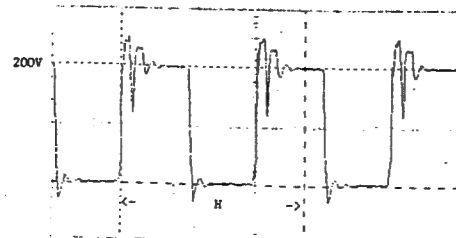
S54 G1



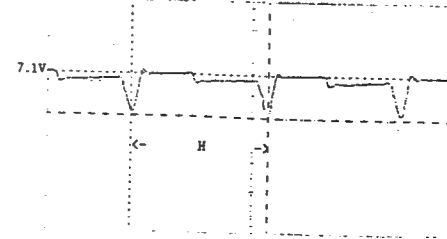
S43 Q107 Drain



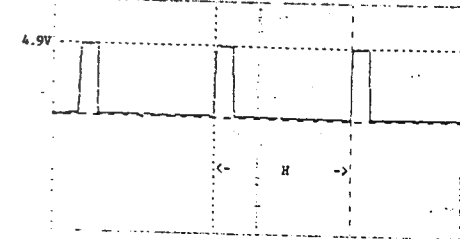
S47 FB1 Pin 3

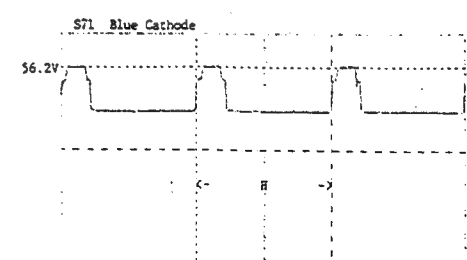
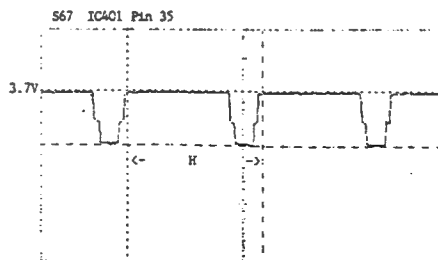
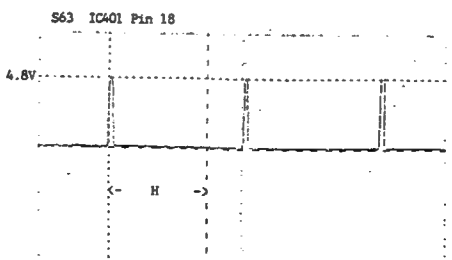
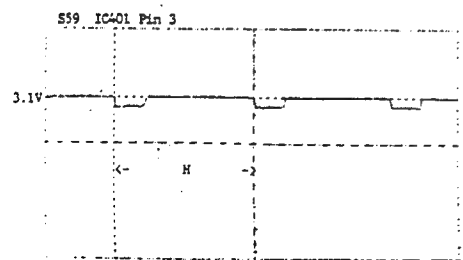
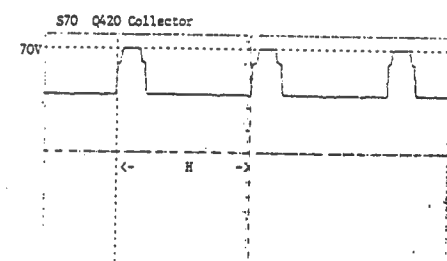
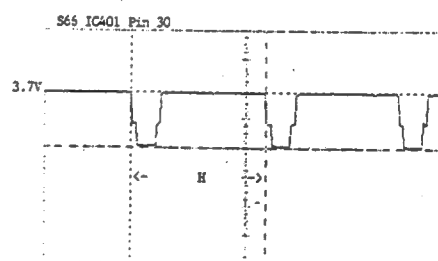
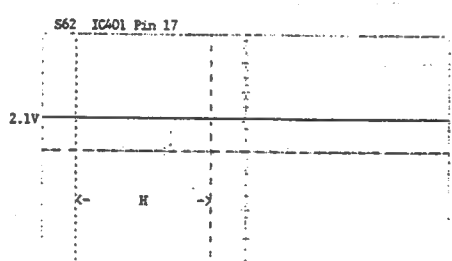
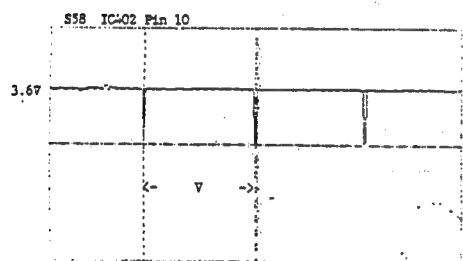
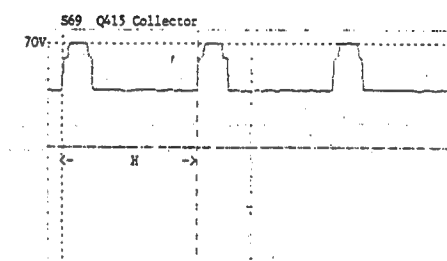
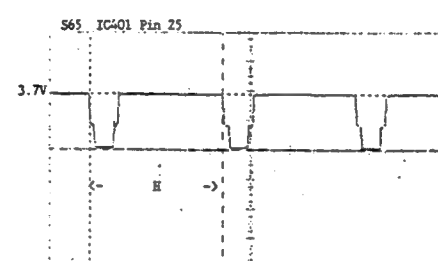
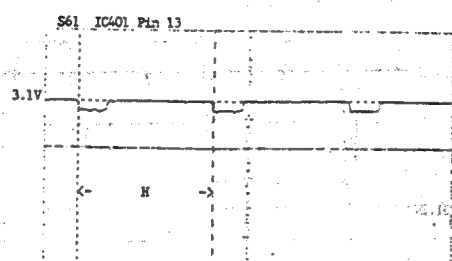
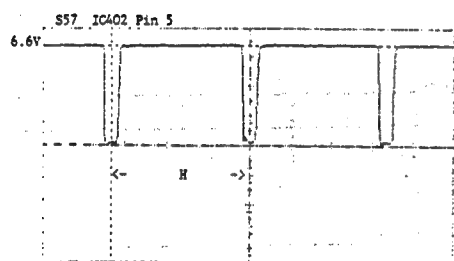
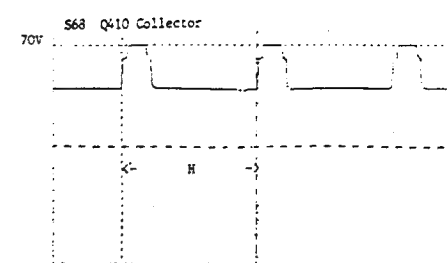
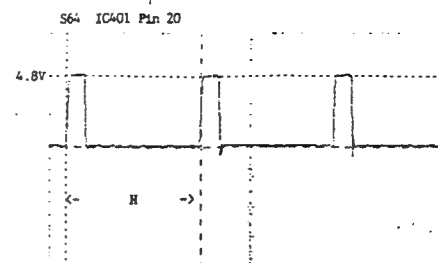
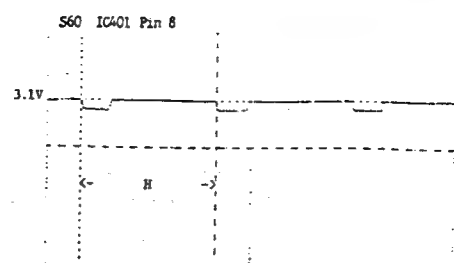
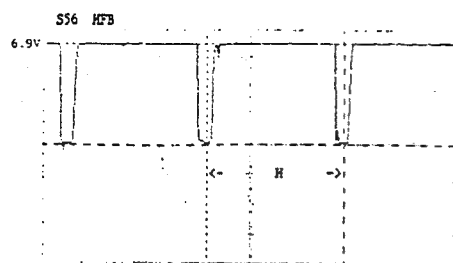


S51 FB1 Pin 9



S55 H-BLK





Chapter Six : Detailed Alignment Procedure

****Before making any adjustment, the monitor should be continually warmed up for at least 30 minutes.**

****The monitor should be orientated towards the East while doing alignment.**

The location of all VRs on Main Board is shown in Figure 6.1.

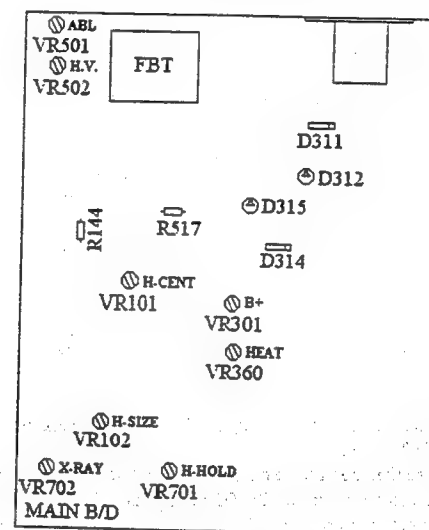
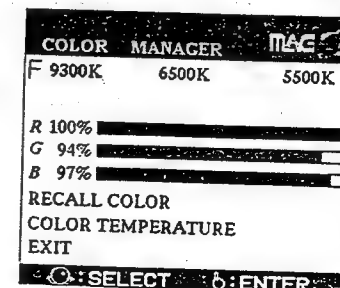
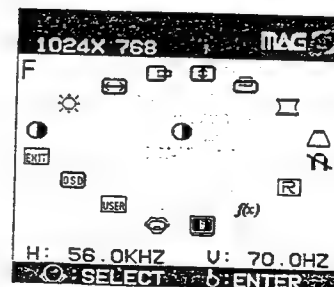
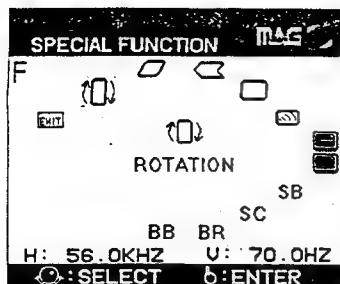


Fig6.1

Menus for alignment are slightly different from those in chapter two. Please refer to the menus below.





1. Regulation of Supplied voltage

Condition: input -	Horizontal frequency	= 79.976KHz;
	Vertical frequency	= 75.025Hz;
	Resolution	= 1280x1024;
	Pattern	= cross hatch pattern;
	Brightness	= minimum;
	Contrast	= minimum;

* Before making the following adjustments, please press Recall  function on OSD Menu to recall the factory preset.

1. Adjust VR301 so that the voltage output of 12.8V at the negative end of D315 is in the range of 12.9V \pm 0.1V DC.
2. Adjust VR360 so that the voltage output of H1 on CRT BD is in the range of 6.3V \pm 0.1V.
3. Adjust FBT Screen VR to ensure the G2 voltage on CRT BD is within the range of 600V \pm 5V.
4. Press the Flywheel knob and enter H-size. Minimize the H-size, and adjust VR102 to make the voltage at the conjunction of R517 and R144 is in the range of 112V \pm 1V.

2. Regulation of Hi-Voltage and X-ray Protection

Condition : input -	Horizontal frequency	= 79.976KHz;
	Vertical frequency	= 75.025Hz;
	Resolution	= 1280x1024;
	Pattern	= cross hatch pattern;
	Brightness	= minimum;
	Contrast	= minimum;

* Before making the following adjustments, please press the Flywheel knob when power on and keep pressing the knob. Release the knob when picture appears. There will be a figure "F" on the OSD. You are in the factory preset mode. It allows you to enter and modify factory preset modes. When all the necessary changes are made, turn the power off to save the changes.

1. Before adjusting Hi-Voltage, use the Hi-Voltage probe to check if there is leakage current nearby FBT and CRT Hi-Voltage anode.
2. Turn off the monitor and insert the Hi-Voltage probe to CRT anode to ensure a good ground connection from electric shock.
3. Turn on the monitor, and adjust VR502 to make the Hi-Voltage in the range of 28KV \pm 0.1KV. Then, adjust VR702 to activate the threshold of x-ray protection in which


the monitor will shut down immediately. Make sure that the threshold of x-ray protection is active between 27.5kV and 30.5kV.

4. Turn off power and reset VR502 to its Hi-Voltage minimum and restart the monitor.
5. Readjust VR502 to make sure Hi-Voltage is in the range of 26.3kV \pm 0.1kV.

Note: a. Normally the Hi-Voltage is about 26.2kV \pm 0.3kV. When something is wrong inside monitor, the Hi-Voltage may increase and produce higher x-ray radiation that is harmful to the human body. To prevent this, an extra circuit has been added to trigger x-ray protection when the Hi-Voltage works abnormally.
b. Set the Brightness and Contrast to the minimum, and the OSD off when making the above adjustments.

3. Improvement for the Tilt of the CRT

Condition: input -	Horizontal frequency	= 79.976KHz;
	Vertical frequency	= 75.025Hz;
	Resolution	= 1280x1024;
	Pattern	= cross hatch pattern;

1. Check the tilt of the video display to make sure that it is in compliance with the specification of 1.5mm on the top side and 2.0mm on the bottom side.
2. If it is not compliant with the specification, please choose Rotation  function from OSD Menu. Then, set the tilt at good condition.

4. Adjustment for the Geometric Distortion

Condition: input -	Horizontal frequency	= 79.976KHz;
	Vertical frequency	= 75.025Hz;
	Resolution	= 1280x1024;
	Pattern	= cross hatch pattern;

* Before making the following adjustments, please press the Flywheel knob when power on and keep pressing the knob. Release the knob when picture appears. There will be a figure "F" on the OSD. You are in the factory preset mode. It allows you to enter and modify factory preset modes. When all the necessary changes are made, turn the power off to save the changes.

1. Set VR701 to its center point.
2. Adjust VR101 to make the raster is horizontally located in the middle of the screen.
3. For other geometric alignment, please refer to Chapter two for detailed information.

5. Adjustment for the White Balance and Brightness

Condition: input -	Horizontal frequency	= 79.976KHz;
	Vertical frequency	= 75.025Hz;
	Resolution	= 1280x1024;
	Pattern	= center block white pattern;

* Before making the following adjustments, please press the Flywheel knob when power on and keep pressing the knob. Release the knob when picture appears. There will be a figure "F" on the OSD. You are in the factory preset mode. It allows you to enter and modify factory preset modes. When all the necessary changes are made, turn the power off to save the changes.

(a) Adjustment for Raster White Balance

1. Set the **Brightness** function to its maximum, and **Contrast** function to its minimum on OSD Main Menu.
2. Choose Color Bias (BB, BR) from Special Function Menu.
3. Adjust Blue Bias (BB) and Red Bias (BR) so that $x = 0.281 \pm 10\%$, $y = 0.311 \pm 10\%$ on your analyzer.
4. Adjust G2 function from OSD Main Menu so that the Raster (background light) is $1.0 \pm 0.2\text{FL}$.

(b) Adjustment for Video White Balance

1. Input center block white pattern.
2. Set the **Brightness** function to its minimum, and **Contrast** function to its maximum on OSD Main Menu.
3. Choose Color Manager from OSD Menu.
4. Adjust each Video Gain to make sure that
 $x = 0.281 \pm 10\%$, $y = 0.311 \pm 10\%$ at 9300K
 $x = 0.313 \pm 10\%$, $y = 0.329 \pm 10\%$ at 6500K
 $x = 0.332 \pm 10\%$, $y = 0.348 \pm 10\%$ at 5500K

(c) Brightness Adjustment

1. Input center white block pattern.
2. Adjust both **Contrast** and **Brightness** function to their maximum.
3. Choose Contrast function from OSD Main Menu, then adjust the center white block pattern to be $\geq 45\text{FL}$.

(d) ABL (Auto Beam-current limit) Setting

1. Input full white pattern.
2. Adjust VR501 so that the brightness is clapped at the range of 31.5 ~ 32.5FL.

6. Adjustment for Focus and Convergence (CG)

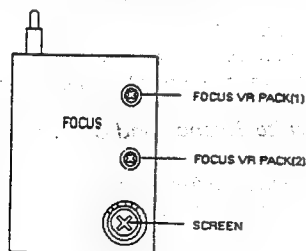


Figure 6.3

(a) Focus Adjustment

Condition: input -

Horizontal frequency	= 79.976kHz;
Vertical frequency	= 75.025Hz;
Resolution	= 1280x1024;
Pattern	= letter "H" pattern; cross hatch pattern;

- Before making the following adjustments, please press Recall function on OSD Menu to recall the factory preset.

Adjust the FOCUS VRs on the FBT to make both the horizontal and vertical lines of cross hatch pattern and the letter "H" pattern as clear as possible.

1. Adjust the FOCUS VR(1) PACK such that the horizontal lines of the patterns become clear.
2. Adjust the Focus VR(2) PACK such that the vertical lines of the patterns become clear.
3. Readjust the FOCUS VR(1) PACK to make both the horizontal and vertical lines of the patterns to be clear.

(b) Convergence (CG) Adjustment

Condition: input -

Horizontal frequency	= 79.976kHz;
Vertical frequency	= 75.025Hz;
Resolution	= 1280x1024;
Pattern	= letter "H" pattern; cross hatch pattern;

- * Before making the following adjustments, please press Recall function on OSD Menu to recall the factory preset.

1. Apply the cross hatch pattern and letter "H" pattern to check if the image is clear, especially at the center and the corners.
2. Input the purple cross hatch pattern. Then, adjust the "four pole", which is on the CRT magnetic rings, so that the purple convergence is within the specifications.
3. Input the white cross pattern. Then, adjust the "six pole", which is on the CRT magnetic rings, so that the white convergence is within the specifications. Use the CG gauge to check the convergence to ensure that it is in compliant with the specifications (Zone A is less than 0.3mm, Zone B is less than 0.4mm).

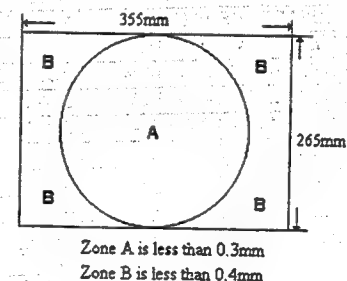


Figure 6.4

Chapter Seven : Spare Parts List

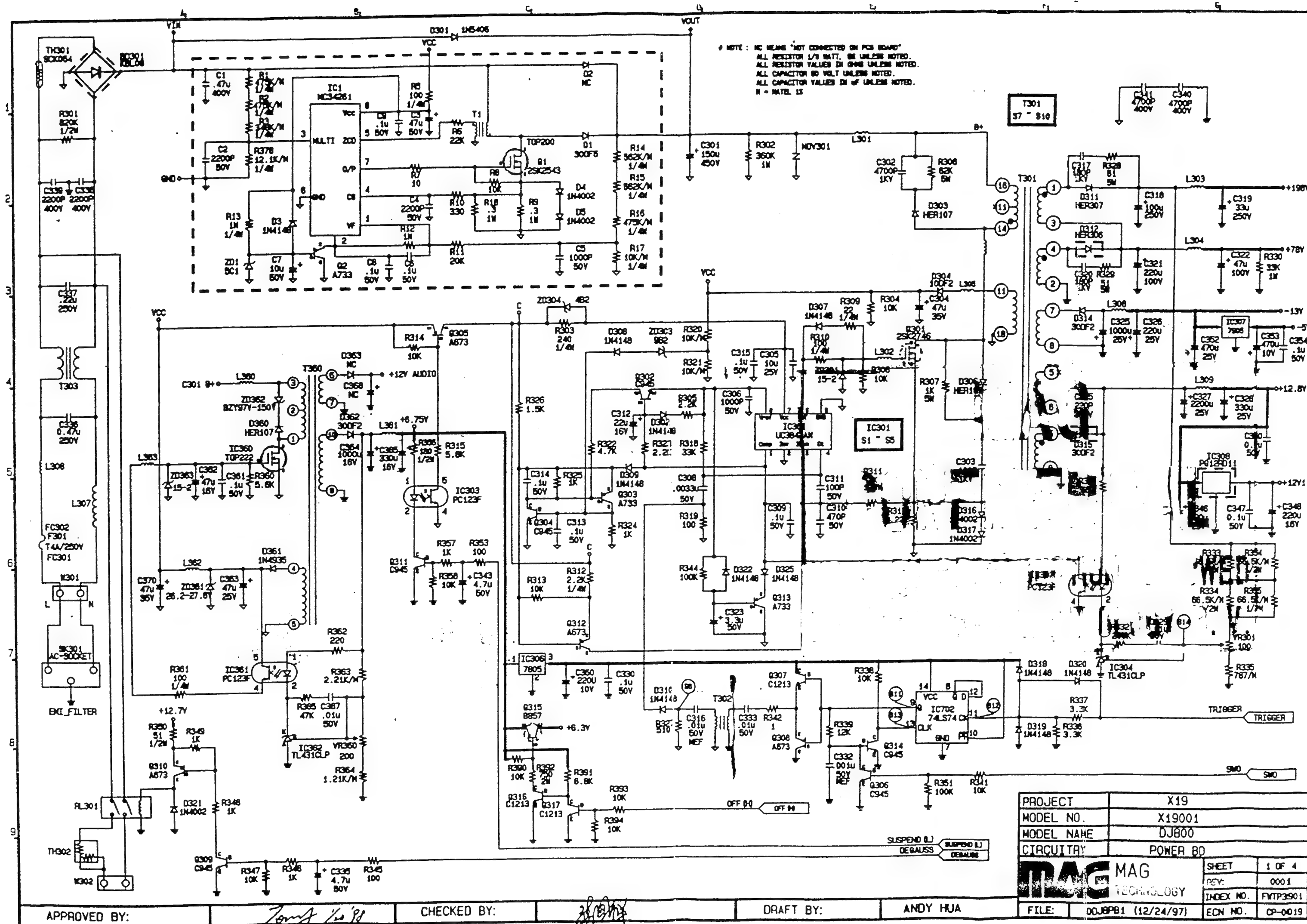
PART_NO	PART_DESC	LOCATION
BCC191160H*	CRT 19" M46LLQ683X01(S)	BCCR01
D*BKBL08**D	DIODE BRIDGE : KBL08	BD301
D*D5TUZ47*S	DIODE DAMPER : 5TUZ47	D109
D*F10DF2**A	DIODE RECOVERY : 10DF2	D304
D*F15DF4**A	DIODE RECOVERY : 15DF4	D110
D*F1N4935*1	DIODE RECOVERY : 1N4935	D361
D*F1N4935*G	DIODE RECOVERY : 1N4935	D201
D*F1N4936*B	DIODE RECOVERY : 1N4936	D416
D*F1N4937*1	DIODE RECOVERY : 1N4937	D360
D*F1SS83**H	DIODE RECOVERY : ISS83	
D*F30DF2**A	DIODE RECOVERY : 30DF2	D314, D315, D362
D*F30DF6**A	DIODE RECOVERY : 30DF6	D1
D*F31DF4**A	FAST RECOVERY DIODE 31DF4	D107
D*FBYT56K*E	DIODE RECOVERY : BYT56K	D311
D*G1N4002**	GENERAL PURPOSE DIODE 1N4002	
D*G1N4148**	DIODE GENERAL PURPOSE : 1N4148	
D*G1N5406*B	DIODE GENERAL PURPOSE : 1N5406	D301
D*LSN5YGWCK	LED: 5NSYGWCK Y/G (C.C.) 5@	LD701
D*S31DQ06*A	DIODE SCHOTTKY 31DQ06	D108
D*UHER103*R	DIODE SUPER FAST HER103	D509
D*UHER105*R	DIODE SUPER FAST HER105 400V	D114, D115
D*UHER107*7	DIODE SUPER FAST HER107 800V	D303, D306
D*UHER108*R	DIODE SUPER FAST HER108 1000V	D123, D126, D504, D505
D*UHER306*7	DIODE SUPER FAST HER306	D312
D*V102471KT	DIODE VARISTOR : VF10M10471K	MOV301
D*ZHZ12A2*H	DIODE ZENER: 11.9V-12.4V 1/2W	
D*ZHZ152**H	DIODE ZENER: 14.5V-15.1V 1/2W	ZD301, ZD363
D*ZHZ242**H	DIODE ZENER: 23.6V-24.7V 1/2W	ZD361
D*ZHZ4C1**H	DIODE ZENER: 4.0V-4.2V 1/2W	ZD304
D*ZHZ5C1**H	DIODE ZENER: 4.9V-5.1V 1/2W	
D*ZHZ6C1**H	DIODE ZENER: 5.8V-6.1V 1/2W	ZD401, ZD7A1
D*ZHZ7B2**H	DIODE ZENER: 6.9V-7.2V 1/2W	ZD501
D*ZHZ9B2**H	ZENER DIODE: 8.5V-8.9V 1/2W	ZD303
D*ZY97C150B	DIODE ZENER: 138V-156V 1.5W	ZD362
FH****001A*	FUSE CLIPER (5*20mm)	FC301
HNC502036*0	SIGNAL CABLE 15P-13P 2000mm	HNCH01
IC*KA79L08C	IC KA79L08AZ (TO-92)	IC504
IC24LC16B*V	IC 24LC16B/P DIP-8 PIN	IC701
IC74LS74ANM	IC SN74LS74AN DIP-14 PIN	IC702
IC78L05ACZD	IC LM78L05ACZ TO-92 3 PIN	IC406
ICCD0008AD6	IC CD0008AD DIP-16 PIN	IC402
ICHSMC79052	IC HSMC7905 DIP-3 PIN	IC307
ICLM2903N*D	IC LM2903N	IC103
ICLM358N**D	IC LM358N DIP-8 PIN	IC704, IC404
ICLM7805CTD	IC LM7805CT TO-220 3 PIN	IC306
ICM52737SPB	IC M52737SP DIP-36 PIN	IC401

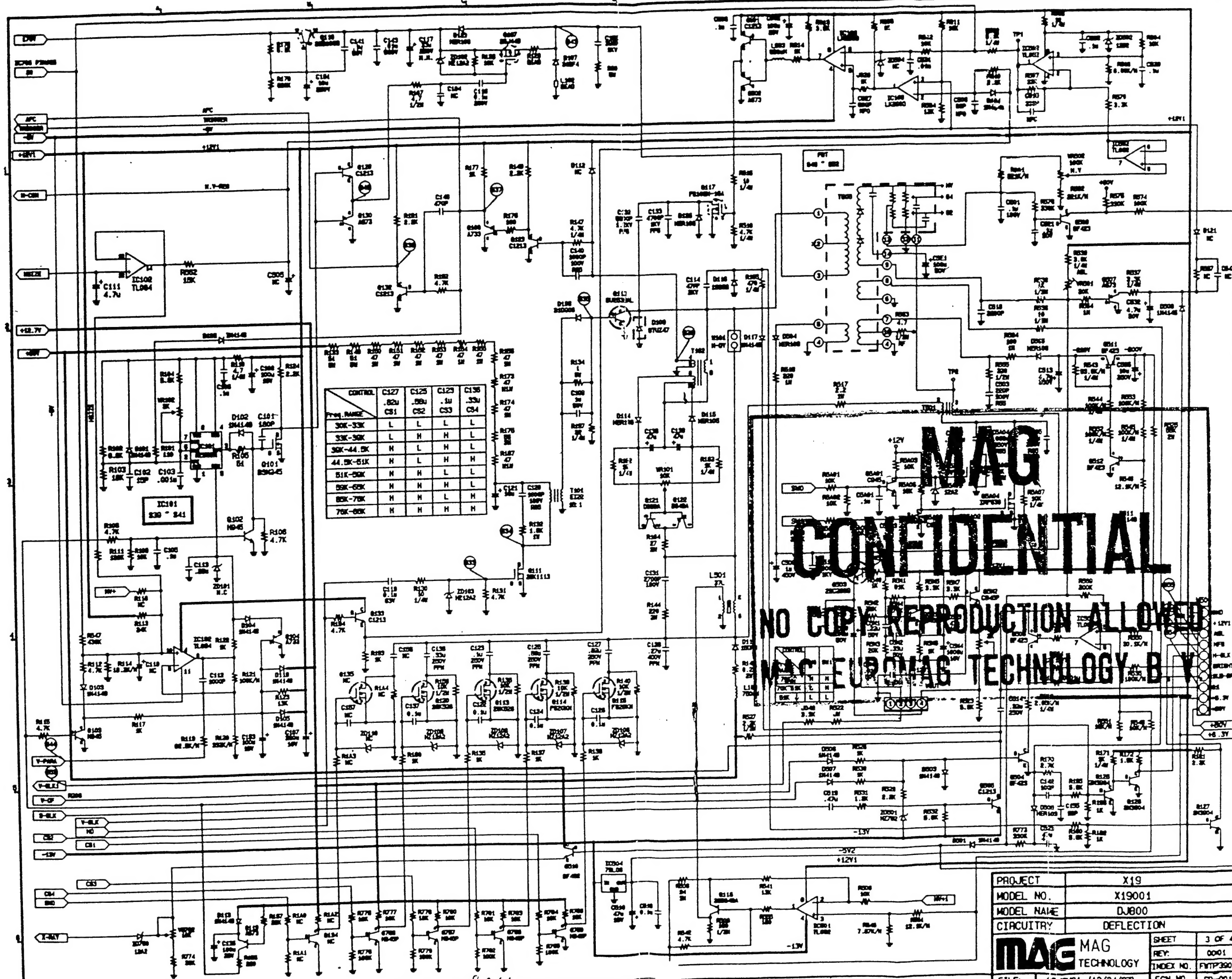
PART_NO	PART_DESC	LOCATION
ICMC34261PM	IC MC34261P DIP-8 PIN	IC1
ICNE555N**J	IC NE555N DIP-8 PIN	IC101
ICPC123FY*G	IC PC123FY DIP-4 PIN	IC302, IC303, IC361
ICPC1883CTN	IC UPC1883CT DIP-30 PIN	IC703
ICPQ12RD11G	IC PQ12RD11 LOW DROP 12V	IC308
ICT0P200Y*7	IC TOP200YA1 TO-220	IC360
ICTDA8172*J	IC TDA8172 DIP-7 PIN	IC201
ICTL082CN*J	IC TL082CN DIP-8 PIN	IC501, IC502
ICTL084CN*J	IC TL084CN DIP-14 PIN	IC102
ICTL431CLPM	IC TL431CLP TO-92 3 PIN	IC304, IC362
ICTL431CLPX	IC TL431CLP TO-92 3 PIN	Q754
ICUC3842ANM	IC UC3842AN DIP-8 PIN	IC301
ICUPD6211CN	IC UPD6211CX DIP-20 PIN	IC705, IC403
MP*10149010	PLASTIC BEZEL	MPBE01
Q*2N3904**D	TRANSISTOR 2N3904 (TO-92)	Q125, Q126, Q127
Q*2N5062**M	TRANSISTOR 2N5062 (TO-226AA)	Q755
Q*2SA1810CH	TRANSISTOR 2SA1810 TO-126	Q413, Q418, Q423
Q*2SA673ACH	TRANSISTOR 2SA673AC	
Q*2SA733P*N	TRANSISTOR 2SA733P (TO-92)	
Q*2SB649A*H	TRANSISTOR 2SB649A (TO-126)	Q116, Q122
Q*2SB857**H	TRANSISTOR 2SB857 (TO-220AB)	Q315
Q*2SC1213CH	TRANSISTOR 2SC1213C (TO-92)	
Q*2SC1907*H	TRANSISTOR 2SC1907 (TO-92)	Q411, Q416, Q421
Q*2SC2235*G	TRANSISTOR 2SC2235 (TO-92)	Q753
Q*2SC2899*H	TRANSISTOR 2SC2899 (TO-126)	Q503
Q*2SC3953ES	TRANSISTOR 2SC3953E (TO-126)	Q410, Q415, Q420
Q*2SC4704CH	TRANSISTOR 2SC4704C TO-126	Q412, Q417, Q422
Q*2SC945P*N	TRANSISTOR 2SC945P (TO-92)	
Q*2SD1088*G	TRANSISTOR 2SD1088 (TO-220AB)	Q118
Q*2SD669A*H	TRANSISTOR 2SD669A (TO-126)	Q121
Q*2SJ449**N	TRANSISTOR 2SJ449	Q107
Q*2SK1113*G	TRANSISTOR 2SK1113	Q111
Q*2SK2543*G	TRANSISTOR 2SK2543 TO-220 500V	Q1
Q*2SK526**G	TRANSISTOR 2SK526 (TO-220AB)	Q113, Q120
Q*BF423***P	TRANSISTOR BF423	Q504, Q506, Q511, Q512
Q*BSN254**P	TRANSISTOR BSN254 (TO-92)	Q101
Q*BU2532ALP	TRANSISTOR BU2532AL	Q112
Q*FS10SM16B	TRANSISTOR FS10SM-16A 800V 10A	Q117
Q*FS20KM5*B	TRANSISTOR FS20KM-5 250V 20A	Q114, Q115
Q*FS7SM16*B	TRANSISTOR FS7SM-16A 800V 7A	Q301
Q*H945P***H	TRANSISTOR H945P (TO-92)	
Q*HBF422**I	TRANSISTOR HBF422 NPN (TO-92)	Q403, Q407
Q*HBF423**I	TRANSISTOR HBF423 PNP (TO-92)	Q404, Q406, Q408
Q*IRF630**A	TRANSISTOR IRF630 (TO-220AB)	Q5A02, Q5A04
TF26V0002S0	X'FMR FBT 26KV	T103
XL00000003K	CRYSTAL : 4.000 MHz 20pf	X700

Appendix

MAG WORLDWIDE SERVICE CENTERS

<i>COUNTRY</i>	<i>ADDRESS</i>	<i>TEL. NO.</i>	<i>FAX NO.</i>
TAIWAN	MAG Technology Co., Ltd. 9F, 245, Tun Hwa South Road, Sec. 1, Taipei	+886-(0)2-7753577	+886-(0)2-7515911
USA	MAG Innovision Inc. 2801 South Yale Street Santa Ana, CA 92704 Internet: http://www.maginnovision.com	Inside California +1-714-7512008 Outside California +1-800-8273998	+1-714-7515522
USA	MAG Technology USA Inc. 2801 South Yale Street, #160 Santa Ana, CA 92704	+1-714-8250980	+1-714-8250979
HOLLAND	Euromag Technology B.V. Valkenierstraat 10B Donkersloot-Noord 2984 AZ Ridderkerk	+31-(0)1804-61211	+31-(0)1804-10648
JAPAN	Magview Co., Ltd. Taisei Bldg. 1-3-4 Osaki Shinagawa-ku Tokyo	+81-(0)3-3493-3588	+81-(0)3-3493-3525
AUSTRALIA	Magtron Monitors Pty. Ltd Unit B2, 1-3 Rodborough Road Frenchs Forest, NSW 2086	+61-(0)2-9975-3727	+61-(0)2-9975-4872



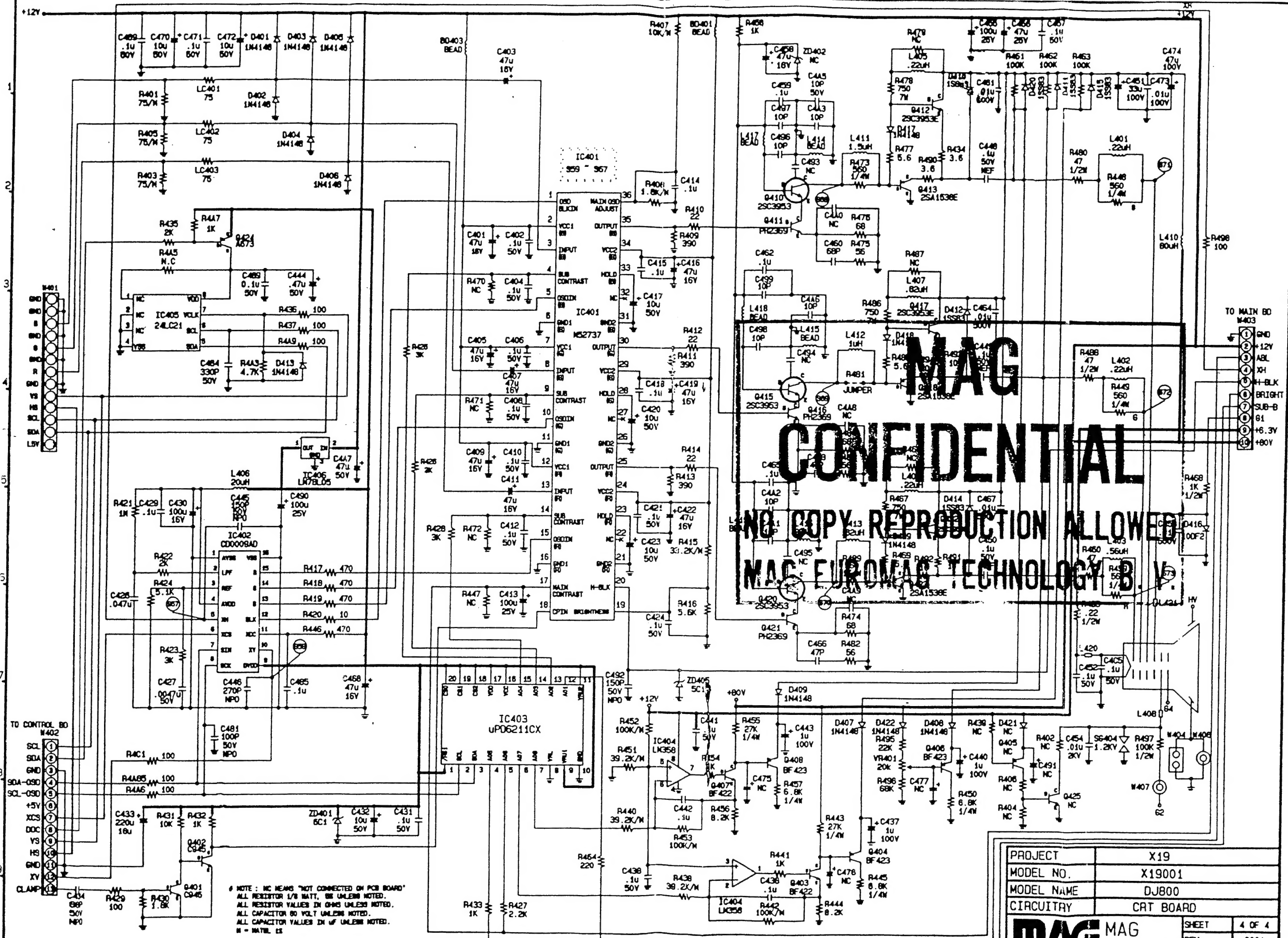


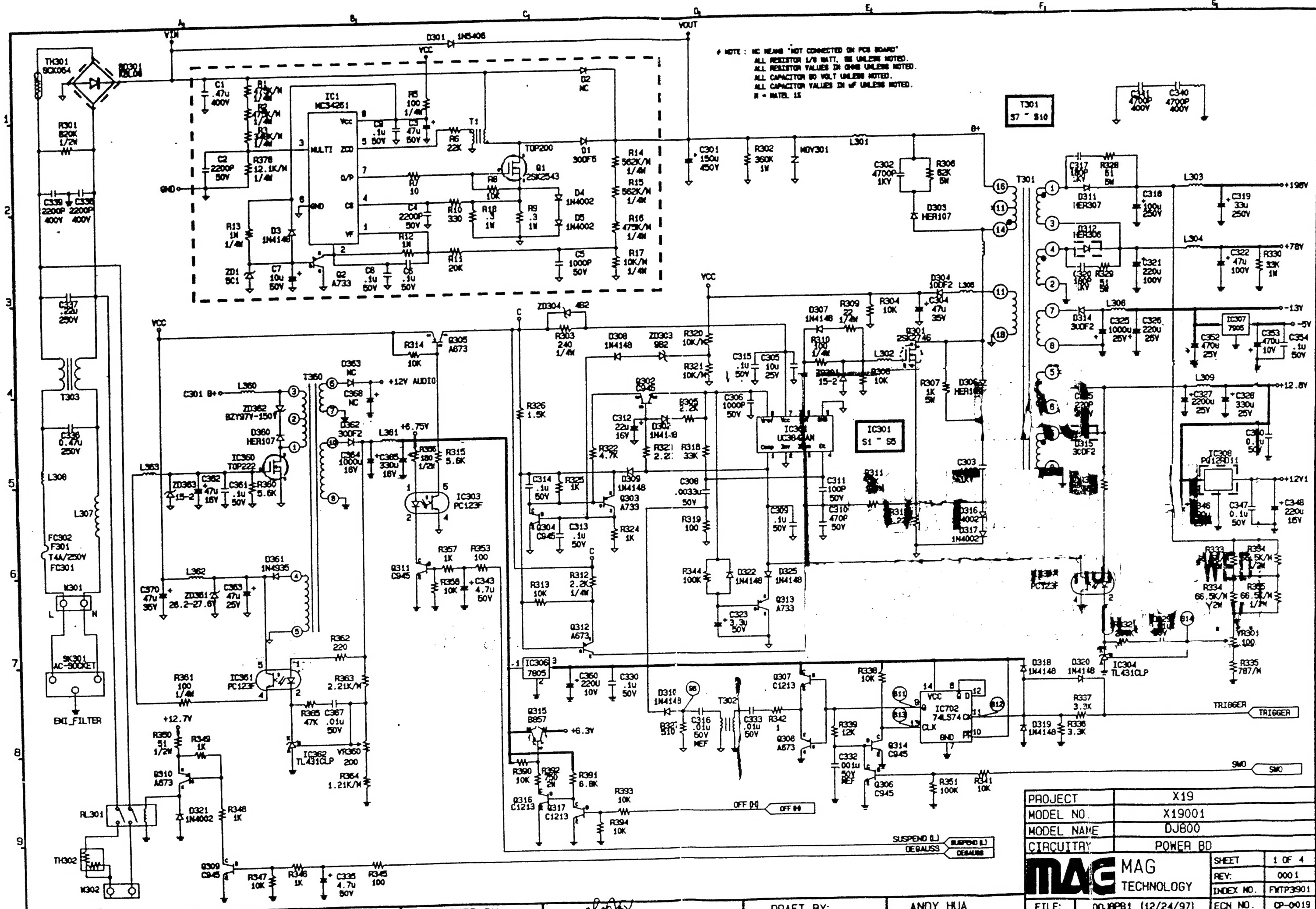
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7-10K	10K	10K	10K	10K
10K-20K	L	L	L	L
20K-40K	H	L	H	L
40K-60K	H	L	H	H
60K-80K	H	H	L	L
80K-100K	H	H	L	H
100K-120K	H	H	H	H

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PROJECT	X19
MODEL NO.	X19001
MODEL NAME	DJ800
CIRCUITRY	DEFLECTION
MAG MAG TECHNOLOGY	
FILE:	(QJMC1 (12/24/97)
SHEET	3 OF 4
REV:	0001
INDEX NO.	FNTP3901
ECN NO.	CP-0019

ANDY HUA





PROJECT	X19
MODEL NO.	X19001
MODEL NAME	DJ800
CIRCUITRY	POWER BD
MAG TECHNOLOGY	
SHEET	1 OF 4
REV.	0001
INDEX NO.	FWTP3901
FILE:	00JB8B1 (12/24/97)
ECN NO.	CP-0019

APPROVED BY:

CHECKED BY:

DRAFT BY:

ANDY HUA